This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

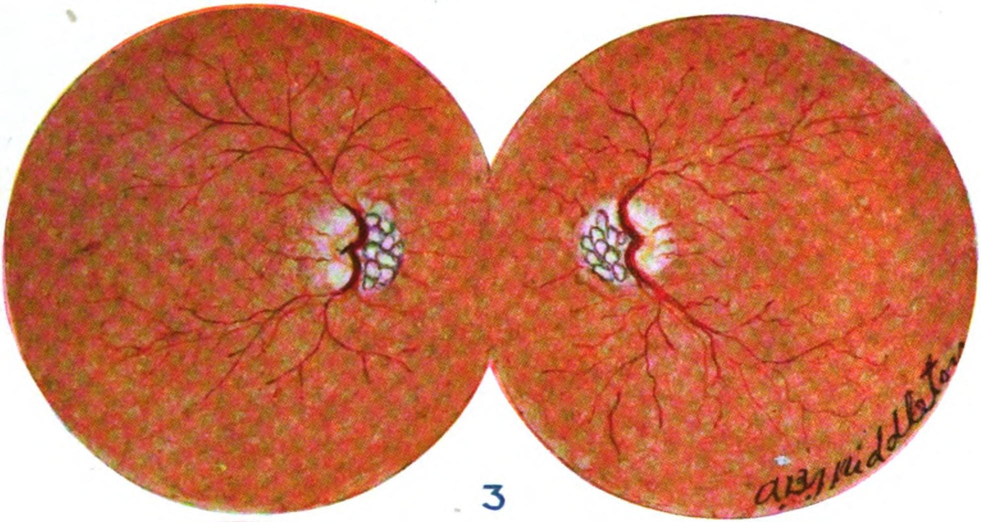
+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

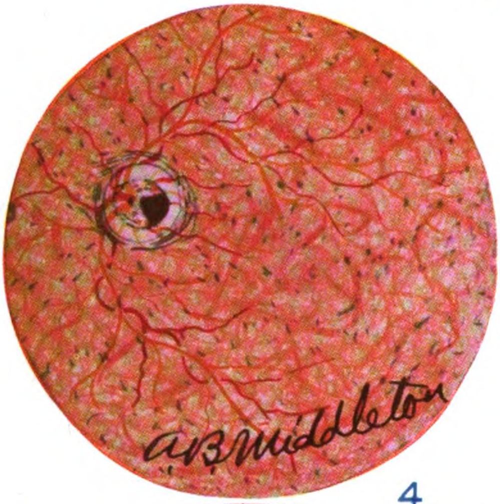
About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

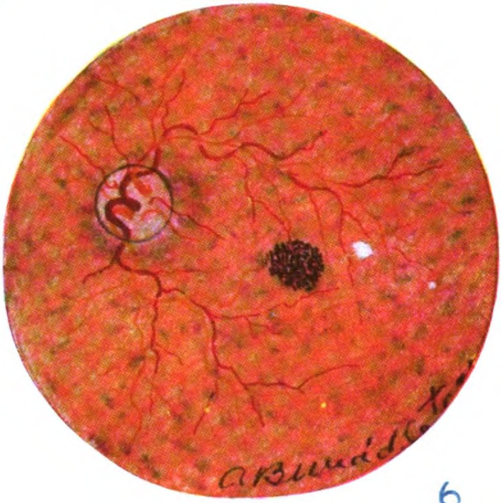
THE FRANCIS A. COUNTWAY LIBRARY OF MEDICINE
HARVARD MEDICAL LIBRARY-BOSTON MEDICAL LIBRARY



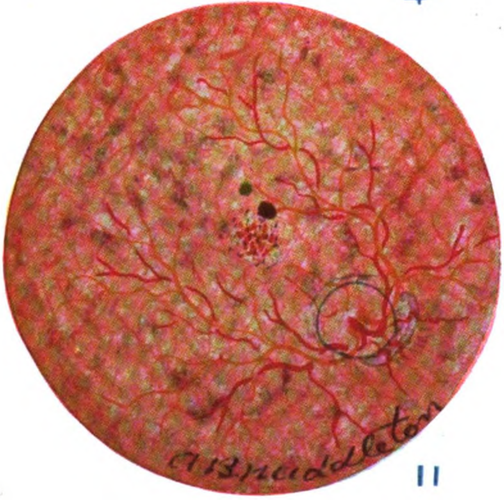
3



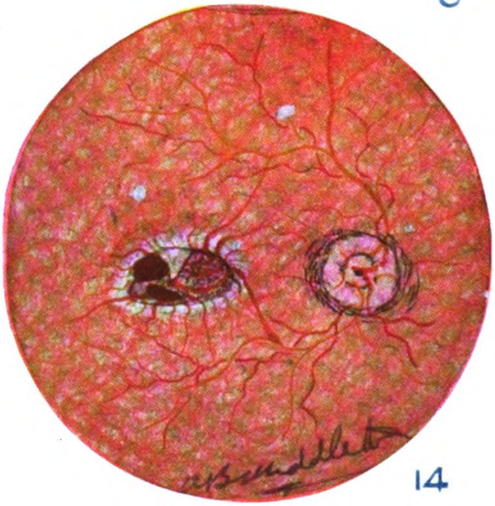
4



6



11



14

CONGENITAL EYE CONDITIONS (MIDDLETON)

AMERICAN JOURNAL OF OPTHALMOLOGY

Vol. 2 JUNE, 1919 No 6

CONGENITAL EYE CONDITIONS AFFECTING VISION OUT OF TWO HUNDRED THOUSAND TROOPS EXAMINED AT CAMP TRAVIS, TEXAS.

MAJOR A. B. MIDDLETON, M. C., OCULIST SPECIAL MEDICAL EXAMINING BOARD.

PONTIAC, ILLINOIS.

This abstract from the official report describes the conditions observed, with colored plate of the most unusual, and half-tone reproduction of sketches of some of the others. Authority to publish granted by the Board of Publication, S. G. O.

More than two hundred thousand troops were examined at Camp Travis, Texas, before the armistice was signed. Out of the eye cases referred to the Special Medical Examining Board, twenty-eighth had a congenital condition of the fundus or bulb causing a reduction of vision.

The cases were carefully sketched and the congenital defect painted in duplicate shades as per the water color drawing accompanying each history and description. The small number of congenital conditions affecting the bulb and fundus sufficient to reduce vision, taken from a large number of young men in the prime of life must not be misleading and give the impression that congenital eye changes are rarely met in civil life.

No doubt there were many afflicted with congenital eye conditions in this group of troops, who had sufficient vision to pass the regular examining board. The Local and Dist ict Boards prevented many from entering the army with insufficient vision, a certain percentage of whom had a congenital defect. These two facts explain the small percentage of cases found.

Time and space will not permit the discussion of each case separately, but the history and description gives all the details. It is strange to note, we found few duplicates.

An interesting thing in the history of congenital eye conditions that affect vision, is the fact that few of those thus afflicted have their eyes examined to determine the cause of poor vision. In this series of twenty-eight cases only one had consulted a doctor with regard to his eyes. Never having had normal vision, they do not realize the handicap from which they are suffering.

CASE 1. MULTIPLE SCLERAL ECTASIA. Private T. J. R., June 28, 1918. Denies specific history. Right eye has not given trouble other than the dimness of vision; did not have eyes examined by a doctor before entering the army; no history of receiving a hard blow over the right eye.

Examination. Age 22 years; white; vision O. D. 10/200; O. S. 20/20; no squint; tension normal; right cornea clear and free from scars; anterior chamber deep. Aqueous clear; iris free from adhesions and deposit of pigment. Lens clear: Vitreous clear and not fluid. Macula normal. Temporal side of the field dark. At the disc is a large circular coloboma of the choroid, the diameter of which is equal to twice the diameter of a normal disc. Directly below the coloboma of the disc, separated by an isthmus of normal choroid, retina and sclera, four millimeters wide, is a second circular coloboma of the choroid, two-thirds the diameter of the one at the disc. The inferior retinal arteries and veins are displaced, passing directly downward from the disc, over both colobomas of the choroid. There is a band of exposed sclera four millimeters wide, within the circumference of each choroidal coloboma, with a sharply pigmented inner margin. The pigmented line is on the outer margin of the congenital hole in the sclera. The depth of each scleral ectasia or pocket is three diopters. On the floor of the scleral ectasia the retinal and cilio-retinal vessels pass over a smooth surface, bending forward over the margin of the scleral hole, continuing on a second, level surface of sclera, exposed by the choroidal coloboma. At the margin the retinal vessels bend forward to the normal level of the retina. The retinal vessels are on the bottom of each hole proving that the retina is intact even tho the choroid is absent. The larger vessels pass into and directly across each hole. The isthmus of retina and choroid between the two holes is normal, having a width of three millimeters. The chorio-retinal vessels are present on the nasal side of the disc but are absent on the temporal side. No choroiditis or choroidal ruptures. Considerable deposit of pigment in the choroidal coloboma area, but an absence of pigment in the bottom of the scleral coloboma or ectasia. The scleral coloboma in both places is larger at the bottom than the top, the vessels disappear before they pass out of the scleral pocket over the choroidal coloboma margin, the same as in an advanced case of glaucoma. The vessels in the upper half of the fundus are normal in size and position. See Fig. 1.

CASE 2. OPAQUE NERVE FIBERS. Private C. S., May 1918. Left eye has never given trouble other than reduced vision. Had not had the eye examined by a doctor, before entering the army. Denies specific history. No history of poor vision in the family. Parents not related.

Examination. Tension normal. No squint. Vision O. D. 20/20; O. S. 20/200; right fundus normal. Left cornea clear and free from scars. Anterior chamber deep. Aqueous clear. Iris free from adhesions and deposit of pigment. Lens clear and normal. Vitreous clear and not fluid. Vessels normal. Macular area normal. Disc normal in size and color except the upper half. Extending upward from the center of the disc is a fan-shaped splash of opaque nerve fibers one disc diameter in width over the retina. The opaque fibers cover the retinal vessels almost entirely, but do not follow their course. No choroiditis or rupture of choroid. Field of vision normal. No congenital pigment deposit.

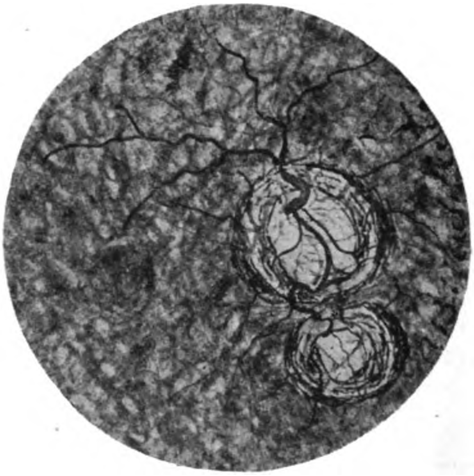


Fig. 1. Multiple Scleral Ectasia.

CASE 3. OPAQUE TISSUE ON OPTIC DISC. Private S. H. E., April 5, 1918. Claims to have had syphilis early in life, but no symptoms or indications that the disease ever existed. Discharged from the army December 6th, 1917 (2nd draft) for beginning optic atrophy. During first induction this soldier malingered with regard to his eyes, pains in the body and several ailments, which he claimed were the result of syphilis early in life. After being in the hospital and held under observation for several weeks, was returned to his company. Discharge from the army for beginning optic atrophy, returned home, the local board reinducting him with the seventh increment. The same tactics were followed in order to avoid the army on the second induction, stimulated with a recent discharge from the army due to optic atrophy. The supposed optic atrophy on a careful examination proved to be a duplicate congenital condition of each disc. The eyes never gave trouble in civil life.

Examination. Tension normal, vision O. D., 20/30; O. S. 20/20. Fields normal; each cornea clear and free from scars. Anterior chambers deep. Aqueous clear. Iris free from adhesions and pigment deposit. Pupils equal and normal in size, reacting normally to light and accommodation. Power of convergence normal; vitreous clear and not fluid. Vessels normal. No choroiditis. Lens clear. No change at the macular region. Discs normal in size but bulging resembling a pseudopapillitis. The nasal half of each disc shows ten or twelve elevated circular areas two millimeters each in diameter, giving the appearance of a white blackberry, these nodules do not extend farther than the margin of the superior and inferior retinal vessels as they pass over the disc, the temporal half of each disc being smooth, but bulging. The discs give a very white appearance, the nasal half with its opaque tissue confined to the disc, resembling in color an advanced case of optic atrophy. No pigment in or near the disc. The white elevated areas are confined to the disc and do not show the usual signs found in cases of exudative deposits. Fields normal. See plate VIII.

CASE 4. CONGENITAL PIGMENT IN PHYSIOLOGIC CUP. Private C. M., July 5, 1918. Poor vision in left eye all of life. The eye has not given one moment's trouble other than reduction in vision. Has not had the eye examined by a doctor before entering the army. All members of family have good eyes. No specific history.

Examination. White; single; tension normal. No squint. Vision, O. D. 20/20; O. S. 10/200. Cornea of left eye clear and free from scars. Anterior chamber deep. Aqueous clear. Iris free from adhesions and deposit of pigment. Pupil slightly dilated reacting slowly to light and accommodation. Power of convergence reduced. Normal field of vision. Lens clear. Vitreous clear and not fluid. Vessels normal. No choroiditis or choroidal rupture. Disc normal in size and color. On the temporal side of the physiologic cup in the left disc is a densely pigmented triangular area. Each side of the triangle equals one-third the disc diameter in length. The pigmented area does not extend beyond the margin of the physiologic cup, but stops abruptly at its temporal margin. The densely pigmented area extends to the bottom of the physiologic cup. One apex of the pigmented triangle ends at the bottom of the cup, at the point where the central vessels enter the nerve trunk. The pigmented area is not elevated or nodular, but smooth and flat. No vascular disturbance near the pigmented area. No signs of a growth, like a melanotic condition might present. Cilioretinal vessels pass thru the pigmented area, which is nothing more than a congenital pigment deposit on the temporal side of the physiologic cup. See Plate VIII.

CASE 5. CONGENITAL VARICOSE VESSELS. Private J. W., June 1918. Left eye has been weak all his life, but has not given trouble other than dimness of vision. Never had the eye examined by a doctor before entering the army. All members of family have good eyes. Specific history denied. No history of trauma.

Examination. No squint. Tension normal. Vision O. D. 20/25; O. S. 20/200. Field of vision normal. Cornea of the left eye clear and free from scars. Anterior chamber deep. Aqueous clear. Iris free from adhesions and deposit of pigment. Pupil normal, reacting to light and accommodation. Power of convergence normal. Lens normal. Vitreous clear and not fluid. Disc normal in size and color, as far as can be determined, there being a congenital varicosity of the retinal vessels in front of the disc. No evidence of arteriosclerosis. At the points where retinal artery and veins leave the disc, they are very tortuous, folding across the disc three times, extending forward into the vitreous. The disc is not bulged. The veins are not compressed by the arteries. The vessels otherwise normal, continue in a normal position after leaving the margin of the disc. The varicosity is confined to the area in front of the disc. See Fig. 2.

Case 6. Congenital Pigmentation Left Macular Region. Private C. M. W., May 24, 1918. Age 23; occupation, farmer; single, white; left eye weak all of life; never had it treated or examined by a doctor; the eye has not given one moment's trouble other than dimness of vision. Denies specific history. No blindness or poor eyes in family. No history of a blow to the eye.

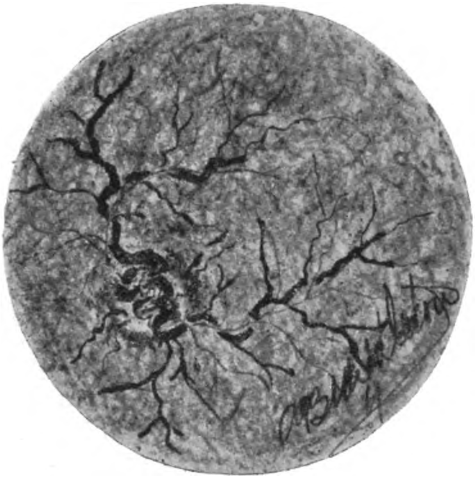


Fig. 2. Congenital varicose vessels of left disc.

Examination. No squint. Tension normal. Vision O. D. 20/30; O. S. 3/200. Left cornea clear and free from scars. Anterior chamber deep; aqueous clear. Iris free from adhesions and deposit of pigment. Lens normal. Vitreous clear and not fluid. Vessels normal. Disc normal in size and shape. At the macular region there is a densely pigmented circular area three-fourths the disc diameter in width. The surface of the area is smooth, but mottled with very small whitish streaks one half millimeter each in width. The white streaks are not exudative but simply unpigmented retina showing between the heavily pigmented portion. Branches of the retinal vessels extending to the margin of the pigmented area, pass over the pigment. Large central scotoma. Pupil reacts to light and accommodation slowly. Power of convergence normal. No choroiditis or rupture of the choroid. No pigment deposits other than the area at the macula. See Plate VIII.

Case 7. Binocular Macular Hole in the Retina, Congenital Private L. A., (Col.) May 9th, 1918. Denies specific history. No mental symptoms present. No history of mental disease in the family. No history of having had a severe blow to the eyes or over the head. Weak eyes all of life, never had them fitted with glasses or examined by a doctor. One eye has always been as good as the other, neither one having given the slightest pain or discomfort other than the dullness in vision.

Examination. Tension normal. Vision O. D. 20/70. O. S. 20/200. Cornea clear and free from scars. Anterior chamber deep. Aqueous clear. Iris free from adhesions and pigment deposit. Pupils equal in size but slightly dilated reacting slowly to light and accommodation. Power of convergence reduced. Disc normal in size and color. Vessels normal. No rupture of the choroid or choroiditis. At the macular region of each retina is a slightly depressed symmetric circular area, the diameter of which is one third the diameter of the disc. The exposed choroid at the bottom of the hole is a dark mahogany red, color more or less mottled with a slight pigment deposit. The margin of the retinal hole is slightly pigmented giving the appearance of a faint halo. Small central scotoma in each eye. No white exudative specks which are usually present in cases of traumatic retinal hole, the result of hemorrhage at the time of accident.

Case 8. Congenital Opaque Tissue on Disc. Private A. P. E., May 2, 1918. Right eye has been weak all his life, but has not given one moment's trouble other than the dimness of vision. No specific history, or history of poor vision in other members of family. No severe blow to the eye.

Examination. No squint. Tension normal. Fields not taken. Vision O. D. 6/200; O. S. 20/20. Right cornea clear and free from scars. Anterior chamber deep. Aqueous clear. Iris free from adhesions and pigment deposit. Lens normal. Vitreous clear and not fluid. Vessels normal. No choroiditis or choroidal rupture. Macular region normal. Disc normal in size and color, but on the nasal side of the disc between the forks of the retinal vein as it passes over the disc is a white circular spot, slightly elevated, two millimeters (apparent size of image) in diameter. No deposit of pigment or signs present to indicate that this might be an exudate. The elevated area is due to opaque white tissue confined to the disc, this case being one of those that represents a white blackberry appearance of the disc when the elevations are multiple. Left disc normal. Vascular system is not disturbed at the site of the white spot. Disc not bulging in appearance, which is the case where the spots are multiple. No opaque nerve fibers in the fundus.

CASE 9. BINOCULAR PIGMENTATION OF FOVEA CENTRALIS. Private R. R. (Col.) May 15, 1918. Farmer; single; aged 24 years; had weak eyes all his life, one eye not much better than the other. Never went to school or had eyes examined by a doctor before entering army. Denies specific history. No trauma.

Examination. No squint. Tension normal; vision O. D. 20/200; O. S. 20/200. Cornea clear and free from scars. Anterior chamber deep and aqueous clear. Iris free from adhesions and pigment deposits. Pupils slightly dilated but equal in size reacting slowly to light and accommodation. Power of convergence normal. Vitreous clear and not fluid. Lens normal. Vessels normal but the fundus is not as deeply pigmented as is the rule with colored people. Field shows a large symmetric central scotoma in each eye. In the macular region in each eye, directly at the fovea centralis is a densely deposited pigmented spot, circular, one millimeter in diameter (apparent size on fundus image) surrounded with light halo one millimeter in width. Disc normal in size and color.

CASE 10. BANDS EXTENDING ACROSS PHYSIOLOGIC CUP. Private B. F. B. July 1, 1918. Right eye has been weaker than the left all his life, but has never given one moment's trouble, and has not been examined by a doctor before entering the army. Denies specific history; no history of trauma.

Examination. No squint. Tension normal. Vision O. D. 1/200; O. S. 20/20. Right cornea clear and free from scars. Anterior chamber deep and aqueous clear. Iris free from adhesion and deposit of pigment. Lens normal. Vitreous clear and not fluid. Vessels normal in size and location. Macular region normal with a bright foveal reflex. Disc normal in size and color with a large deep physiologic cup. Horizontally across the cup are two suturelike bands resembling silk worm gut. The upper band is bifurcated at the temporal end, the bifurcation extending upward to the side of the cup. These bands are given off below the exit of the central retinal vessels and are on a level with the disc. The normal lamina cribosa fibers can be seen plainly in the bottom of the physiologic cup. Field of vision not

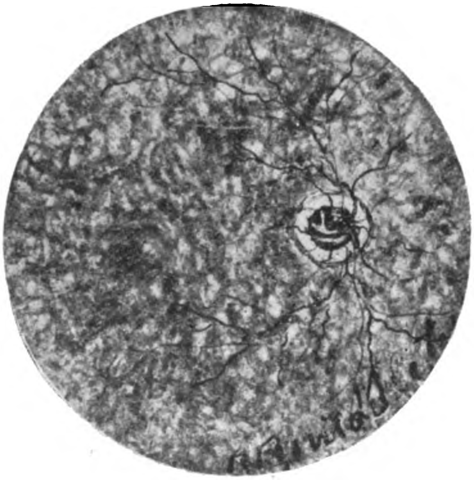


Fig. 3. Bands extending across physiologic cup.

taken. Left eye normal. See Fig. 3.

CASE 11. FOLD IN THE RETINA. Private M. P. (Mex.), June 26, 1918. Denies specific history; has not had a blow to eye. Right eye has been weaker than the left all his life, but never had it examined or treated by a doctor. The eye has not given the slightest trouble other than reduced vision.

Examination. No squint; tension normal; cornea clear and free from scars. Anterior chamber deep. . Aqueous clear. Iris free from adhesions and deposit of pigment. Lens normal. Vitreous clear and not fluid. Vessels normal in shape and position. Disc normal in size and color. At the macular region there is a circular area of granular choroiditis of a dark red color one half the disc diameter in width. In the granular area are many small pigment specks one millimeter each in diameter giving a mottled appearance. Above the center of the macula are two densely pigmented circular spots two millimeters (apparent size) each in diameter, on the same level horizontally, three millimeters apart with no evidence of exudate. On the nasal side of the disc is a distinct fold in the retina, two millimeters (apparent) from the margin of the disc and two millimeters wide extending vertically toward and parallel with the nasal margin of the disc. The fold is a light gray color, free from pigment deposit along its margins, which is present in most cases of choroidal rupture. The retinal vessels leaving the nasal side of the disc pass over the retinal fold at right angles bending forward as they pass across the folded retina. No rupture of the choroid. No deposit of pigment or signs of hemorrhage at the site of the fold. Field of vision not taken. See Plate VIII.

CASE 12. DERMOID CYST OF THE LIMBUS. Private R. H. July 5, 1918. No tuberculosis in family. No history of trauma. Since childhood has noticed a round pinkish growth on the left eye, never painful or inflamed. Eye has not given one moment's trouble other than reduction of vision. No members of the family afflicted in this way. All have good eyes. No specific history.

Examination. Vision O. D. 20/40; O. S. 20/20. Tension normal; no squint; left cornea exposed, clear and free from scars. Anterior chamber deep. Aqueous clear. Pupil semidilated and kidney shaped, reacting to light and accommodation, but slow in convergence. Iris blue, free from adhesions and pigment deposit. Lens normal. Vitreous clear and not fluid. Disc normal in shape and color. Vessels normal. Macular region normal. On the nasal side of the cornea about "3:30 o'clock," on the limbus and slightly beyond the pupillary margin is a circular, soft, movable tumor, one-fourth inch in diameter, of a pinkish gray color. The tumor is soft, giving the sensation under touch of hairs or varicose veins within the mass. No hairs growing from the surface. A band at the scleral margin of the tumor extends toward the outer canthus resembling a wide, thin pterygium. Many small vessels in the mucosa covering the tumor. Around the tumor in the cornea is a light colored halo. The tumor is freely movable but has a broad base and is six millimeters in thickness, which prevents the lids closing on the temporal side. Field not taken. See Fig. 4.

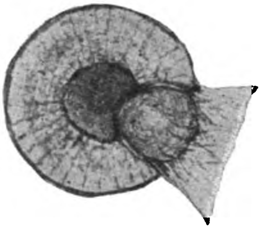


Fig. 4. Dermoid cyst of limbus (congenital).

CASE 13. COMPLETE PUPILLARY MEMBRANE. Private, J. R. M. May, 1918. No specific history. No eye trouble other than the slight dimness of vision in right eye. No tuberculosis in family. No history of trauma. All members of family have good eyes. Has not had eyes examined by a doctor before entering army.

Examination. Vision O. D. 20/20; O. S. 20/30. Tension normal. No squint.

Brown eyes. Cornea clear and free from scars. Anterior chamber deep. Pupil normal size. Iris free from adhesions or deposits of pigment, but there is a thin congenital filmlike membrane, covering the whole right pupil area, attached to the iris equally around the whole margin of the pupil. The membrane is nearly transparent. Examination with the loupe is required, which shows a vertical slit extending from one side of the pupil to the other resembling a cat's eye. The slit is two mm. wide at the center, gradually coming together at each end near the margin of the pupil. Atropin dilated the pupil slightly in the horizontal direction, but not vertically. The opening in the pupillary membrane separated equal to twice its original width under a mydriatic. The distant vision is reduced under atropin to O. D. 20/200. The left pupil is free from membrane or pupillary bands. No signs of inflammation or choroiditis in either eye.

CASE 14. ECTASIA OF SCLERA. Private J. L., (Col.), July 18, 1918. Specific history two years; has been blind in the right eye all his life, but it has never given the slightest trouble except the dimness of vision. The eye has never been hit a hard blow; or been red and inflamed. An external strabismus of twenty degrees present that has existed since childhood.

Examination. Vision O. D. 1/200; O. S. 20/20. Tension normal. External squint 20 degrees. Right cornea clear and free from scars. Anterior chamber deep. Aqueous clear. Iris free from pigment deposit and adhesions. Pupil dilated, reacting slightly to light, but not to accommodation. No power of convergence. Lens normal. Vitreous clear and not fluid. Disc normal in shape and color. Vessels normal. Field not taken, power of vision too low. Below the macular area in the right eye is an elliptical shaped depression in the sclera three diopters deep. The hole is one and one-half disc diameter in length, and three-fourths of one disc diameter in width. The axis of the ellipse is up and in, toward the disc, at about the angle of eight o'clock. The retina dips down into and covers the bottom of the scleral opening, which is larger at the bottom than at the opening through the choroid. The retinal vessels pass down over the edge of the sclera into the scleral ectasia, disappearing the same as in the case of a glaucoma cup, appearing again, crossing the bottom of the hole making the same turns in their exit. Many small retinal vessels pass down over the margin of the hole, which is not sharp cut but rounded. There is no choroid in the depression, the choroid is very thin over the margin of the hole. The retina is considerably pigmented over the floor of the hole, but is not pigmented over the balance of the fundus. The temporal end of the hole contains a deposit of exudate and two deeply pigmented spots resembling apple seeds. Over them, extending from above, is a fanlike exudate covered with blood vessels. The handle end of the fan extends down into the hole, between the two apple-seed-like pigment deposits, attaching itself to the floor. The exudate and pigment deposit in the temporal end of the hole is the result of a specific choroiditis that has taken place in the congenital opening in the sclera. See Plate VIII.

CASE 15. DERMOID CYST LIMBUS OF CORNEA. Private B. S. Dec. 7, 1918. Age 25 years; farmer; single; has had a small pink lump on the right eyeball all of his life. Never has given the slightest trouble. The sight is as good in one eye as is the other. No history of injury to the eye. Each member of his family has good eyes, and no growths upon them.

Examination. Vision O. D. 20/20; O. S. 20/20. Tension normal. No squint. Brown eyes. Exposed portion of right cornea clear and free from scars. Anterior chamber deep. Aqueous clear. Pupil kidney shaped, reacting to light and accommodation. Power of convergence normal. Iris free from adhesions and pigment deposit; lens normal. Vitreous clear and not fluid. Vessels normal. Macular region normal. Disc normal in size and color. No choroiditis or rupture of the choroid.

Field of vision not taken. At about "7 o'clock" on the limbus of the cornea is a light pinkish circular growth, three-sixteenths of one inch in diameter resting upon the cornea. Around this growth is a white halo resembling an advanced arcus senilis. The margin of the pupil appears to be displaced inward opposite the growth. The tumor is soft, no hairs growing from its surface. The broad base gives the appearance of being deeply attached to the cornea. The mucosa or conjunctiva over the growth is filled with many small vessels. Extending from the outer margin to the bulbar conjunctiva the growth spreads out into a wide band, like a thin pterygium. The eyelids close perfectly. No signs of a growth on the left eyeball. Not painful and never inflamed. See Fig. 5.

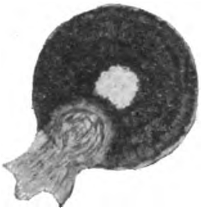


Fig. 5. Dermoid cyst limbus of right cornea.

CASE 16. FUCHS' COLOBOMA. Private B. E. S. May 3, 1918. Has never been able to see as well with the right eye as the left. The eye has never given a moment's trouble and never had it examined by a doctor. Never had a severe blow to the right or any kind of inflammation.

Examination. Tension normal. No squint. Vision O. D. 20/200; O. S. 20/50. Right cornea clear and free from scars. Anterior chamber deep. Aqueous clear. Iris free from adhesions and pigment deposit. Pupil normal in size, reacting to light and accommodation. Power of convergence normal. Vitreous clear and not fluid. Lens normal. Vessels normal. Macular region normal. Disc normal in color and shape, but directly below the disc is a crescentic coloboma of the choroid, slight yellow color and slightly depressed. The inferior retinal vessels pass over it, making a slight dip in their transit. No pigment deposit. No choroiditis or rupture of the choroid.

CASE 17. PIGMENTED SCLERAL NEVUS. Private C. T., July, 1918. Mexican; age 30 years; farmer; married; does not speak English. Interpreter states that soldier claims the black spot on the white of his right eye has been there all of his life, but is not painful and never has been inflamed or sore. No history of injury or severe blow to the eye. The eye has always been blind, never consulted a doctor with regard to the eye. General health good, works hard every day, has not lost any weight. No member of the family afflicted in this manner. No specific history. No tuberculosis in the family.

Examination. No squint. Tension normal. Right cornea clear and free from scars. Anterior chamber deep. Aqueous clear. Iris free from adhesions and deposits of pigment. Brown eye. Pupil normal in size, reacting slowly to light but not to accommodation. Power of convergence sluggish. Lens normal. Vitreous clear and not fluid. Vessels and disc normal in size and color. No choroiditis, or rupture of the choroid. Fundus dark and deeply pigmented, a condition that is often present in normal Mexican eyes. Left eye normal. Between lids of the right eye opposite the outer half of the palpebral fissure, on the surface of the sclera is a triangular pigmented area. The base of the triangle is at the limbus of the cornea, the apex extending to the temporal end of the palpebral fissure. The base of the triangle is three-eighths of one inch wide, one-half inch in length. The pigmented area is a dark brown color and not elevated or nodular. No disturbance of the vascular system over or near this area. The bulbar mucosa is elastic and not adherent over the nevus. The deposit is confined to the surface of the outer layers of the sclera. The base of the triangle extends beyond the limbus into the corneal tissue two millimeters. The choroid and retina opposite the pigmented area are normal. The pupils dilated equally with atropin.

CASE 18. RETINITIS PIGMENTOSA. Private H. B. F. History. "Have had good eyes all my life but cannot see as well after dark as other people, in fact can't get around without feeling my way with a stick. Several in family have weak eyes, but I don't know what is wrong with their eyes. I am the only one that cannot see after dark. Have had my eyes examined by eye doctors and told that I have night blindness. Father and mother not related; no intermarriage among ancestors." No specific or tubercular history.

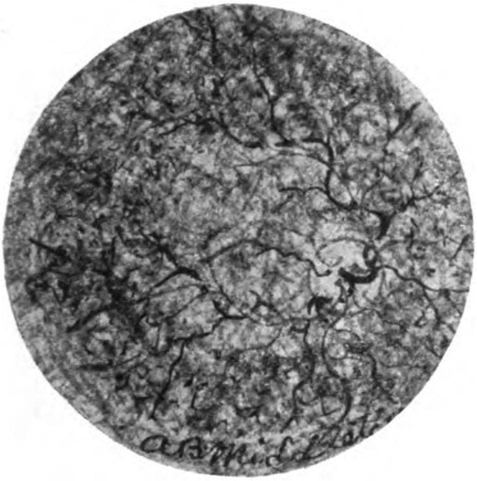


Fig. 6. Retinitis pigmentosa.

Examination. Age 22 years; single; farmer; vision O. D. 20/15; O. S. 20/20. No squint; tension normal; cornea of each eye clear and free from scars. Anterior chamber deep. Aqueous clear. Lens normal.. Iris free from adhesions and pigment deposits. Vitreous clear and not fluid. Vessels and discs normal in shape and color. No choroiditis or rupture of the choroid. Pupils normal, reacting to light and accommodation. Power of convergence perfect. Field of vision shows the usual typical field found in cases of retinitis pigmentosa. On the surface of the choroid is a pigmented band completely surrounding the fundus, the extreme outer margin of the fundus being clear and free from pigment deposit. The pigment deposit is spindle shaped, several spindles in a cluster located in the anterior layers of the. retina, the retinal vessels passing under the pigment deposits. Fig. 6.

CASE 19. COLOBOMA OF THE LENS. Private J. K. S. Has had weak eyes all his life; age 25 years; carpenter; married; eyes have never given the slightest trouble other than the reduced vision. Father living; good sight. Mother 58 years old, had a painful trouble with eyes for many years. The last seven years has been obliged to feel her way about the room. Three brothers all have good sight; one sister, age 35 years, has weak eyes; one sister died of appendicitis at the age of 16 years, had weak eyes; one sister has two children, one girl good eyes, one boy E. H., 11 years old, in the blind school, Austin, Texas. Mother's brothers and sisters have good eyesight.

Examination. No squint; tension normal. Vision O. D. 20/50; O. S. 20/20. Both corneas clear and free from scars. Anterior chambers deep. Aqueous clear. Pupils normal in size, reacting to light and accommodation. Power of convergence normal. Iris free from adhesions and pigment deposits, but tremulous, the right much more than the left. Vitreous clear and not fluid. Vessels normal. Disc normal in size and color. No choroiditis. No coloboma or rupture of the choroid. No coloboma of the ciliary body, iris, or retina. Right lens shows two coloboma notches on its lower margin. The larger notch at the position of "four o'clock," is a perfect semicircle, the apex extending four millimeters toward the center of the lens the base of the semicircle six millimeters broad. A second coloboma notch at the position of "six o'clock," also a semicircle, but smaller, extending three millimeters toward the center of the lens with a base of four millimeters. The colobomas are separated by a strip of clear lens two millimeters in width. The left lens has two incomplete colobomas which are nothing more than slight depressions in the lower margin of the lens. Lenses do not improve vision. Field of vision not taken.

CASE 20. FUCHS' COLOBOMA BINOCULAR. Private B. E. S., May 3, 1918. Eyes have been weak all life, the right weaker than the left. Soldier, illiterate, never had eyes examined by a doctor before entering the Army. No specific history or history of tuberculosis. Eyes never pain or become inflamed. No weak eyes in family. Suffers considerably with headaches, the main reason for not attending school, which increased the severity of the attacks.

Examination. Farmer; 23 years old, single; no squint. Tension normal. Cornea of each eye clear and free from scars. Anterior chamber deep; aqueous clear. Pupils normal in size, reacting to light and accommodation. Power of convergence reduced. Iris free from adhesions and deposit of pigment. Lens normal. Vitreous clear and not fluid. Vessels normal in size and color. Each fundus has a coloboma of the choroid four millimeters (apparent) in width directly below, and connecting with the disc. Field of vision not taken. Retinoscopy under a mydriatic: Horizontal —3, vertical 0, in each eye. Corrected with +3 cylinder axis 90 gives 20/40 vision in each eye.

CASE 21. MONOCULAR GUTTATE CHOROIDITIS. Private L. A. L., April 30, 1918.

Has not seen well out of left eye, and it has been crossed all his life. The eye has not given one moment's trouble other than poor vision. All the members of family have good eyes; the patient only one that is cross eyed. No history of severe blow to the eye.

Examination. Left internal strabismus 25 degrees. Tension normal. Farmer. No specific or tubercular history. Age 22 years; vision O. D. 20/20; O. S. 1/200. Retinoscopy right horizontal +3, vertical +3. Left horizontal +2, vertical +2. Left cornea clear and free from scars. Anterior chamber deep. Pupil dilated slightly, reacting slowly to light and accommodation. Iris free from adhesions and pigment deposit. Vessels normal. No choroiditis or rupture of the choroid. Disc normal in size and color. At the macular region is a circular cluster of guttate choroiditis dots, seven in number, "two millimeters" each (apparent), in diameter, of a yellowish gray color, arranged in a wheel shape, the diameter of which is ten millimeters; one dot acts as the hub and is directly over the fovea centralis. The right fundus is free from guttate choroiditis. Field of vision shows a large central scotoma. Cannot rotate eye outward beyond the central line. See Fig. 7.

CASE 22. BINOCULAR GUTTATE CHOROIDITIS. Private J. A. R., May 1, 1918.

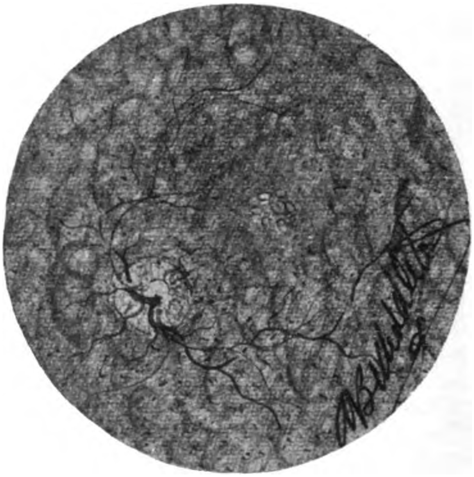


Fig. 7. Monocular Guttate Choroiditis.

No specific or tubercular history. Vision has been poor in both eyes all his life; but never had them examined or fitted with glasses. Eyes have not given one moment's trouble other than dimness of vision. Several members of the family have weak eyes, the cause not known.

Examination. Farmer; age 24 years; vision O. D. 5/200; O. S. 20/20. No squint. Tension normal. Cornea clear and free from scars. Anterior chamber deep and aqueous clear. Pupils larger than normal but equal, responding to light and accommodation. Power of convergence normal. Iris free from adhesions and pigment deposit. Vitreous clear and not fluid. Vessels normal. Discs normal in size and shape but both have a dirty gray color. At the macular region is a cluster of grayish white choroiditic dots free from pigment deposit. The dots are two millimeters each in diameter, the cluster is circular and made up of fourteen. This area is equal in size to the disc. The center of the circle is over the fovea centralis. The fundus of each eye is a near duplicate. No rupture of the choroid or choroiditis other than the dots at the macula. Central scotoma each field of vision.

CASE 23. GUTTATE CHOROIDITIS BILATERAL. Private C. W. H., April 29, 1918. No specific or tubercular history in family. Never received a severe blow to either eye. Vision has been poor in the right eye all his life, but never consulted a doctor with regard to eyes. Many in the family have weak eyes, but the cause is unknown.

Examination. No squint. Tension normal. Vision O. D. 15/200; O. S. 20/25. Retinoscopy, right horizontal +4. Vertical +4. Left +1. Horizontal +1. Farmer; 23 years old; single. Guttate dots found in each fundus which are near duplicates. Cornea clear and free from scars. Anterior chamber deep. Aqueous clear. Pupils normal and equal, reacting to light and accommodation. Power of convergence slow. Lens normal. Vitreous clear and not fluid. Discs normal in size and color. Vessels normal. No rupture of the choroid or choroiditis except the circular cluster of guttate dots at the macular region of each fundus. The center of the circle is directly over the fovea centralis; this circle is made up of eleven grayish yellow dots "two millimeters" each in diameter, not pigmented and covering an area equal in size to the surface of the disc. The dots are smooth, located in the choroid. Field of vision not taken.

CASE 24. GUTTATE CHOROIDITIS BILATERAL. Private W. R. B., May 3, 1918. No specific or tubercular history in the family. No history of severe trauma. All members of family have good eyes. Vision poor in left eye all his life. The eye has not given trouble other than the reduced vision. Has not had the eye examined by a doctor before entering the service.

Examination. No squint or increased tension. Cornea of each eye clear and free from scars. Anterior chambers deep and aqueous clear. Left pupil slightly dilated, reacting to light and accommodation slowly. Power of convergence reduced. Iris free from adhesions and pigment deposits. Lens normal. Vitreous clear and not fluid. Vessels normal. Discs normal in shape and color. No rupture of the choroid or choroiditis except a circular area of guttate choroiditis in the macular region. The area of guttate dots is covered with about twenty-five smooth yellowish gray dots, "two millimeters" each in diameter, nonpigmented. The center of this area is directly over the fovea centralis and covers a space about the size of the disc. Field of vision not taken. Fundus picture the same in each eye.

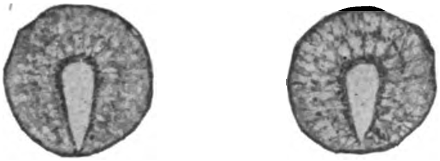


Fig. 8. Binocular coloboma of iris.

CASE 25. BINOCULAR COLOBOMA OF IRIS. Private J. G., May, 1918. Mother claims that he had "cat's eyes" all his life, due to a scare that she had just before his birth. None in the family have anything of this kind. Parents were not of the same family. Eyes have not given any trouble except poor vision and people stare at them all the time. No history of trauma.

Examination. No squint. No specific or tubercular history. Tension normal. Cornea clear and free from scars. Anterior chamber shallow. Aqueous clear. Pupil of each eye keyhole in shape with the slot downward, the bottom of the sides coming together at the limbus. Iris blue, free from adhesions and pigment deposit. Pupil reacts slowly to light and accommodation. Power of convergence normal. Vision O. D. 20/40; O. S. 20/40. Vitreous clear and not fluid. Vessels and discs normal in size, shape and color. No coloboma of the choroid, ciliary body, retina or lens. Pupil dilates slightly in all directions with homatropin. Fields of vision not taken. See Fig. 8.

CASE 26. MONOCULAR MICROPHTHALMIA. Private J. T. (Mex.), August, 1918. Right eye has always been blind and much smaller than the left. Vision in left eye 20/20; right eye has not given any trouble other than the blindness and appearance. Never had any inflammation or a severe blow to the right eye.

Examination. Mexican. Does not speak English; information gained through an interpreter. Right eyeball one-third smaller than the left. Cornea five millimeters in diameter, but clear and free from scars. Anterior chamber shallow, filled with clear aqueous. Iris very narrow, not responding to light. Homatropin produced slight dilatation. Lens clear. Not able to determine fundus condition. Vitreous not clear enough to see the disk or fundus. All motor muscles normal. No squint. No tension. No specific or tubercular history. None of the family troubled in this manner. Parents not relatives. Farmer, 26 years old; married; children normal eyes.

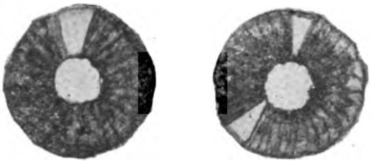


Fig. 9. Binocular sectional albinism of iris.

CASE 27. BINOCULAR SECTIONAL ALBINISM OF IRIS. Private E. J. (Col.), May, 1918. No specific history. Had white sections in the brown part of eyes all his life. Eyes never painful or become inflamed. Has not had them examined by a doctor. None in the family afflicted this way. No albinos in the family. Cannot stand light without squinting the eyes. Vision always poor in the left eye. No history of injury or tuberculosis.

Examination. Farmer; single; age 23 years; vision O. D. 20/20; O. S. 20/200. Tension normal. No squint. Cornea clear and free from scars. Anterior chambers deep and aqueous clear. Lens normal. Pupils normal and equal, reacting to light and accommodation. Power of convergence sluggish.. Iris free from adhesions and deposit of pigment. In the iris of the right eye, which is a dark brown, is a white transparent sector six millimeters wide including the entire width of the iris at the angle of "eleven forty-five o'clock." Through the transparent sector it is possible to see the fundus and the outline of the lens with slight difficulty. With the exception of the one nonpigmented sector the remainder of the iris is one shade, and normal in color. The left iris has two nonpigmented sectors, three millimeters each in width, extending thru the entire width of the iris. One of the sectors in the left iris is at "two o'clock" and the other at "six," they are white and transparent, the same as the sector in the right eye. The pupils dilate easily and equally under atropin. The refraction is normal in each eye. Soldier squints with eyes all the time to avoid the light. Vitreous clear and not fluid. Vessels normal in shape and color. Disc normal. No choroiditis or rupture of the choroid. No coloboma of the choroid, ciliary body, iris, or lens. Fields of vision not taken. See Fig. 9.

CLINICAL OBSERVATIONS IN THE OPHTHALMIC SERVICE AT CAMP SEVIER, S. C.

MAJOR WARREN E. KERSHNER, M. C.

BATH, MAINE.

This account of the ocular conditions encountered in such a service is published under authority to publish granted by the Board of Publication, S. G. O.

The class of cases seen in the ophthalmic service of an army base hospital is somewhat different from the cases observed in civil eye clinics. The range of cases is more limited for two reasons: first, the ages of the patients are nearly alike, or have been during the period covered by this study, second, similar or nearly similar environment of the men narrows the field of possible ocular conditions.

From January 1, 1918, to November 1, 1918, the new cases admitted to the clinic for treatment have numbered 1953 or just under two hundred new cases per month. This does not include the many visits for routine vision testing, a part of physical examinations, nor does it include the officers, their families, nor members of the Army Nurse Corps, the records of whom are kept in a separate class for reasons of age, sex, living conditions, etc.

It may be of interest to speak of the refractive work. It indicates the number of young men who go without proper refractive work or who are not constant in wearing their correction. Many such were found, numbering very nearly fifty per cent of those applying for correction of refractive errors. The histories of these patients also demonstrate that excessive near work may not be the chief factor in sending the young hyperope to the ophthalmic surgeon. By far the majority of these cases came complaining of the effect of the wind and especially the sunlight upon the eyes. A proper refraction relieved the symptoms complained of. A study of the refractive work of all the camps will give us the refractive index of the young male American as a class. We did at Camp Sevier 839 refractions of all kinds. About fifty per cent of these had been refracted previously and slightly over ten per cent were still wearing their corrections. All refractive work was done under atropin or homatropin. Retinoscopic and ophthalmoscopic refractions were estimated in all cases and thoro going trial case work was done. The results were as follows:

14% accepted plus spheres
03% accepted minus spheres
10% accepted plus cylinders
03% accepted minus cylinders
53% accepted plus spheres and plus cylinders
06% accepted minus spheres and minus cylinders
11% accepted plus spheres and minus cylinders or minus spheres and plus cylinders.

It should be noted as well that very nearly thirty per cent of the refractive errors showed also an anisometropia of 0.75 D. or over.

CONJUNCTIVITIS. There have been 741 cases of acute conjunctivitis treated at this clinic. These include nearly four hundred cases treated, which were classed as epidemic. But this socalled epidemic coexisted with one of mumps and measles.

In the whole series the pneumococcus was the offending organism in a large percentage of cases. On the whole the findings from a bacteriologic standpoint are not materially different from the series reported by the author in the July number of the American Journal of Ophthalmology, page 480, except a slightly higher pneumococcus percentage, a lower number in which no organism was found, and double the percentage of Koch-Weeks infections.

The conjunctival diseases include, besides some chronic cases, eight cases of self-imposed traumatic reaction and two marked cases of vernal catarrh. In one of the latter the hyperplasia of the conjunctiva entirely encircled the cornea and presented a decided elevation with a width of two to three millimeters.

PHLYCTENULAR CONJUNCTIVITIS was seen seven times, with an additional case which invaded the cornea.

TRACHOMA. Sixteen cases of trachoma have passed through our hands. By permission of the commanding officer we were allowed to keep cases of this disease in the hospital under proper regulation in order to carry out treatment. The so-called Bacillus bulgaricus treatment was tried thoroly in seven cases of chronic or quiet trachoma and upon two cases of the active type. Of the acute cases, both were seen when there was marked congestion, injection, pain and discharge. Pannus was marked in both cases. The treatment increased every symptom to such an extent that this method of treatment had to be discontinued. The cases were then treated with copper stick until the active symptoms subsided and the pannus disappeared when a shift was made to the Bacillus bulgaricus. Again every symptom increased, requiring discontinuance once more. The tablets used were fresh, kept in a cool place and powdered daily. The plan of treatment in these, as well as in the chronic cases, was that described by Crawford, in his paper read before the Nashville Academy, May 16, 1916, entitled "Fourteen Cases of Trachoma or Granular Lids treated with Bacillus bulgaricus" and an article by the same author in the Annals of Ophthalmology of October, 1917, Vol. XXVI., No. 4, page 557. As implied, the treatment in acute cases was not satisfactory, quite the contrary, for the injection and edema increased, the discharge increased, the pain and discomfort were worse and the pannus enlarged under this medication. The treatment simply had to be abandoned after all the trial safety would allow. The seven chronic granular cases were under treatment from three to four months with the freshly powdered tablets. In no case did we see active excitation of the disease after or during treatment. The treatment was not unpleasant to the patients but that is as far as it goes. In no case was improvement seen either before or after manual expression of the granules. In two additional cases the diagnosis of which was doubtful at first, but which were held under observation, we found some slight temporary improvement during the quiet and restriction of the observation and treatment period. Upon return to the wind, smoke, sun and dust of their active army life these cases quickly relapsed. As a result of these few cases treated and studied it is safe to state that there is no field for this treatment in the army. The cases which showed any improvement in our hands have been small. The improvement is temporary. Even if the results were better the time required is too long to be of practical value in the army. The treatment is detrimental to acute cases. As a result of the experience at Camp Sevier, it is believed that the treatment has no influence upon the trachoma.

CONJUNCTIVAL CONDITIONS. One of the striking conditions constantly met with in great numbers in these young men was pinguecula and pterygium. That age is no barrier to these two conditions in the south and middle southwest was manifest at this clinic. It was seldom that these patients came to the hospital for the manifest condition. On the contrary they came for refractive errors.

Two patients were seen here who presented a rather rare condition, namely blood channels of the conjunctiva. One was a decided blond, the other just as positively a brunet. The history in both cases was unimportant especially in that there had been no history of injury, no foreign body nor other conjunctival change. These "vessels" have been present in one case for a year and in the other for a year and a half. With the channels were also present enlarged veins which were tortuous. Adrenalin was used to get the effect and to demonstrate whether or not there was active injection present. The drug contracted the vessels but not the channels. A section of the conjunctiva was removed in both cases and submitted to the laboratory for examination and report. The reports were similar and to the effect that the specimen presented vessels with only endothelial cells as vessel walls together with apparently enlarged vessels of normal structure. The normal as well as the abnormal vessels both lay deep and superficial in the conjunctival tissue. In places the channels showed the lumen as flattened septa-like slits lined with the same endothelium cells between these and fibrous tissue. These cases were similar to the section exhibited by Lang at the Royal London Ophthalmic Hospital on April 27, 1905, as reported in the American Encyclopedia of Ophthalmology, Vol. IV, page 3073.

There has probably been less gonorrheal conjunctivitis in the army than one would expect. Our cases numbered five. Each was correctly diagnosed by the virulent symptoms. The laboratory confirmed the character of the infection by smear and culture in each instance. The treatment employed was as follows: continual cold packs, silver nitrate 2% once daily, flushing of the eye every twenty minutes night and day with boric acid, saturated solution, with argyrol used as a float every hour, protection of the unaffected eye, light diet, continual rest in bed and attention to the bowels. Under the above treatment all cases were germ-free in a week and ready for duty soon after. In no case did the infection reach the sound eye. No complications were present upon the first visit nor developed after treatment began.

Hordeolum and chalazion were common. Nothing of interest occurred in connection with the lid cases.

One case of long standing symblepharon came for treatment because of the irritation and discomfort produced by exposure to the wind and dust of the outdoor life. The adhesion was complete, of the lower lid, the external two-thirds. The attachment was at the corneo-scleral junction and directly outward to the outer canthus. Conjunctival flaps were brought down from above. The flaps healed in place readily, producing a very satisfactory result. The patient went to France with his organization free from symptoms.

Strabismus. There have been forty-one operations for strabismus to date. The majority came to the clinic for relief of the disfiguring effects. In some of these the opportunity to train the muscles after operation was short or did not exist.

The squint cases were classed as follows:

	Number
Strabismus convergens ....(28)	
Monocular	16
Alternating	12
Strabismus divergens ....(11)	
Monocular	3
Alternating	6
Secondary to tenotomy internal recti	2
Strabismus verticalis ....(2)	

All of the patients were between 19 and 25 years of age except one who was 31. The perimetric deviation was from 30 to 55 degrees. In all cases the onset was before the sixth year of life. Glasses had been, or were being worn by but three cases. The glasses and the refractive status were of little practical value as only one was affected or benefited more than 5 degrees by glasses. Eleven of the convergent squint cases had evidently a "working" fusion faculty, as binocular single vision developed after operation. Seven of the divergent type also resulted in binocular single vision. One of the divergent group was converted from a constant alternating squint to one of the occasional type. In three cases of the convergent type a second operation was required in order to secure a satisfactory cosmetic result. In the first class the operation consisted of one of the muscle shortening operations with graduated tenotomy of the opposing muscle in twenty-five of the twenty-eight cases. In the three remaining cases of this group a shortening only was done.

All the divergent cases were operated by complete tenotomy of the external recti muscles. The vertical cases were treated by a graded tenotomy of the superior rectus muscle of the affected side. Of the two patients with a divergent squint secondary to a tenotomy of the internal recti, one was of four years standing, the second of twelve. The first one presented a left eye, proptosed, with a wide palpebral fissure and limited internal rotation. The capsule of Tenon was opened. The rectus was found and was brought forward to or in advance of its normal position and attached by scleral sutures. The capsule above and below the muscle was advanced as well. In the second case double complete tenotomy of both internal recti had been done, which had resulted in a wide divergence. The operation in this case consisted of opening the capsule on both sides, finding the atrophied muscles and bringing them into proper position and, by scleral suture, fixing them there as indicated in the previous case. Both cases after four months were as follows: from a cosmetic standpoint straight eyes. In the second case we find 4° of exotropia for distance and 11° for near. The binocular single vision in the first case is not constant but up to the present has improved slowly. The excursions are limited in inward duction in both cases. There would seem at this time to be a fair degree of permanency and, considering the length of time the old tenotomized muscles have been out of use, the results are satisfactory.

Lacrimal Disease. Five patients have been operated for obstruction of the lacrimal duct with chronic dacryocystitis. Both sides were operated in three of the cases. Two patients, one with single and one with double obstruction, were treated by the trichloracetic acid method of Gifford. Three treatments by this method were all that were needed to be convincing that the method was out of place in the army. The time from duty was long in each instance. While the end results were all that could be expected the resulting scar was as marked as by extirpation and the extra time for the wound to fill up with granulation tissue made this method less satisfactory. All other cases were operated by extirpation. The end results have been satisfactory and all cases but one have been ready for duty in from five days to one week. The writer can see no comparison between the methods used here.

Corneal Disease. It should not be passed without comment that there have been no cases of ulcus serpens or interstitial keratitis seen at this clinic. Considering that the clinic has been the place of treatment for well up to a hundred thousand young men of all classes, the above statement seems remarkable.

Several cases of dendriform and simple ulcers were treated but require no remarks.

A very interesting and unusual case of disciform keratitis was under treatment. The onset and course was typical and uneventful at first. It was not possible to find a clue to the cause except a positive history of syphilis of six years' standing, but the laboratory findings were negative to the Wassermann reaction. At the height of the clinical course there appeared, opposite the central area on the posterior surface of the cornea, a perfectly pearl-white nodule, fixed and very small. The general reaction in the eye was not marked and there were no evidences of iris or uveal involvement; the iris remaining clear and mobile up to this point. On the fifth day after the appearance of the nodule the central area bulged forward slightly. Pressure was applied but the next day the cornea perforated and the anterior chamber emptied. The eye now began to be somewhat painful. From the first visit of this patient fluorescein was used daily but no abrasion of the corneal epithelium was found. Following the perforation of the cornea a very small tortuous sinus thro the cornea stained. It required magnification to see this well. This sinus remained open for four days even under pressure. At this time and following the closure the general reaction and pain were greater, and a mild low-grade iritis or iridocyclitis developed which gradually resolved as the corneal condition began to take on the characteristics of the more usual form of the disease. The terminal condition is now what is to be expected from disciform keratitis, namely a permanent opacity, faded, with the discs less distinct. All the indications as described by Fuchs were present, the added element being the nodule on the posterior corneal surface and the perforation.

INJURIES. One of the most unique of accidents was a discission of the lens by a safety pin. A soldier, who worked in the shoe repair shops, pulled a pair of shoes from a line. The shoes were fastened together by a safety pin. The pull opened the pin and it hit the eye with enough force to cause the following injury. The point entered the left eye at about 2 o'clock and 3mm. inside the corneoscleral junction, proceeding down and in. The point first hit the lens capsule 2 mm. below the center of the lens, then the lid action in closing applied the force to the long arm of the lever which brought the point of the pin almost directly up, opening the anterior lens capsule for fully 3 mm. Swelling of the lens was prompt and so pronounced that it was followed by a rise in tension. Linear extraction was done. The eye at no time suffered more reaction than if a sterile instrument had entered the globe.

Another case of contusion of the globe was followed by a severe hemorrhage into the anterior chamber, with blocking of the filtration angle and an increase in tension. This was evacuated by opening the anterior chamber and was followed by a second collection of blood which had to be evacuated a second time. There was no injury to the posterior segment of the eye, there was no detachment or tearing of the iris tissue which could be discovered, and the lens was intact.

MISCELLANEOUS. The close association and perfect *coördination between the different services* in a base hospital, especially the Head Section and X-Ray Laboratory, have made it possible to do thoro investigative work in the focal infection cases and place the ocular conditions where they belonged regarding their etiology. The operative work of the dental service deserves recognition for prompt and thoro-going abolition of dental defects which served as causes of ocular pathology. The nose and throat service has been thoro and active in eliminating sinus and nasopharyngeal foci. The cases of ocular disease traced to dental or nasopharyngeal foci of infection have been about evenly distributed between the reflex neuroses and active inflammatory processes. Sinus infections have produced the majority of the muscular and asthenopic symptoms while apical abscesses, tonsilar infection and active ethmoidal infection have caused the majority of the inflammatory changes in the ocular structure. In eleven cases of iritis or iridocyclitis abolition of abscessed tooth roots caused an immediate resolution in the eye symptoms. One case of active exudative choroiditis was traced to an extensive involvement of the ethmoid cells and frontal sinus. The cases of unstable muscle balance, asthenopia, blepharopasm and accommodative deficiency have been much harder to trace and place exactly. Service conditions demand that soldiers be returned to duty with as little loss of time as possible, therefore in these cases the different departments worked together and at the same time. Ocular equilibrium was established by nasal or throat treatment in seven cases after proper and thoro going refraction had failed to relieve the symptoms, and this without altering the refractive correction. The same is true in one case of tooth impaction. In no case did the operative work on the teeth or nose and throat cause an increase in the ocular symptoms.

A summary of the *syphilitic conditions* of the eyes is being made by Captain James M. Blackwood, M. C. The end results in these cases have not been so satisfactory as they might have been. The cases affecting the uveal tract have presented the so-called quiet type and have progressed to a considerable extent before being seen by the ophthalmologist. Treatment of such cases is needed over a considerable period of time and observation over a much longer time still. The constitutional treatment of the syphilis seemed to give slow results in the cases of long standing and it should be strongly emphasized that the ocular treatment should be just as active, thoro and vigorous as tho the general disease was not known. Especially must this be true for the reason that very active general treatment may increase the local reaction in the eye. There has been one such case here. This was in a late case where full doses of arsphenamine or one of the similar preparations was used. An immense amount of work must be done before the definite relationship of syphilis to eye diseases is placed on a stable foundation, especially the influence of general treatment and the type of constitutional treatment best suited to different phases of ocular pathology.

A considerable variety of *fundus lesions* have been seen. These may be classed for our purpose, into the active cases and the non-active or old cases. Of the active class there have been seven cases of optic neuritis, eleven of choroiditis, four of neuroretinitis, one of retrobulbar neuritis, two of hyalitis and two of choked disc. The old cases were more numerous and for the most part were seen in applicants for refractive corrections; simple optic atrophy seven, secondary optic atrophy five, pigmentary retinal degeneration six, familial optic atrophy four, central choroiditis eight, disseminated choroiditis six and rupture of retina one.

Malingering has been constantly present in one of its many classes or varieties. Much has been said and written on this subject, which has become a rather deep study at present. It seems to the writer that too much classification is confusing. He prefers to divide them into two main groups: The positive group which would include all cases who with intent, "manufacture" their condition or complaint without a basis or ground work for such a complaint, and this without respect to the mental or physical type of the malingerer. Then a negative class who often do have a ground upon which an exaggeration can be used to their advantage, or those who for fear do not fully realize that they are trying to evade duty. All such cases, of whichever type, must be treated as individuals. The author has found nothing short of wonderful the sight-restoring influence of treatment which is not pleasant or is more disagreeable than the "blindness," or "pain," or "neuralgia" or whatever they complain of. Therefore, in the second group especially and in some of the first group, silver nitrat, one or two per cent put into the conjunctival sac, without a local anesthetic, has worked like a charm. After three to six such applications the patients will usually and gladly demonstrate that they can see "lots better," or are less sensitive than when they applied for treatment. The cases are not a few in which the vision has improved (?) from 20/100 to 20/20 or 20/30 under such treatment.

A field which has been much neglected has been a study of the eye findings in the soldiers sent to the hospital for nervous and mental examination. Under the present orders to the effect that all men who seem unstable, hard to handle and excitable be sent to the psychiatrist, there has been a wide field of study of the eye conditions in these border-line cases. Such a study may have an important bearing on the early diagnosis of mental states, especially the functional psychoses. That this work has not been undertaken is due to the fact that there have not been ophthalmologists enough on duty here, to attend to the routine work of the eye department and find time for the extensive observation along these lines at the same time. This work has been recently undertaken and should yield valuable results.

TUBERCULOUS IRIDOKERATITIS—SOME FEATURES IN ITS PATHOLOGY.

CAPTAIN FRED T. TOOKE, C. A. M. C.

MONTREAL, CANADA.

This is a report of the histologic findings in four cases subjected to microscopic study, with comment upon the significance of the appearances observed. Read at the fifty-fourth annual meeting of the American Ophthalmological Society.

Iritis, perhaps more than any other form of ocular disease, has manifested a modification in its classification in comparatively recent years. Even including that evanescent issue, conjunctivitis and its bacteriology, no branch of the subject has made more actual advance than the study of iritis. The text-book of less than two decades ago taught that lues was responsible for 75 per cent of all patients suffering from iritis, and that so-called rheumatism, gonorrhea, tuberculosis, and trauma had to scramble for the balance.

The Wassermann reaction, the complement-fixation test, the careful examination of the sources of autogenous infection, teeth, tonsils, accessory nasal sinuses, and bowel, have modified the classification percentage of earlier days to a very appreciable degree. It is questionable if the figures of Hirschberg, who quotes 12 cases in 60,000, and Terson, 2 in 30,000 eye cases, would stand in the light of our present knowledge. The masterly work of de Schweinitz on uveitis, read before a recent International Ophthalmological Congress, would support such a challenge.

With a preconceived endeavor of exhibiting some of the tuberculous manifestations of the disease I have been peculiarly fortunate, during the past few years, in having material supplied me manifesting tuberculous processes in the iris with other associated features of the disease.

I would, at the outset, record my thanks to those of my colleagues who have by their contributions, made this paper possible.

The pathologic manifestations of this subsection of iritis are no less varied than the alterations of our point of view clinically and etiologically of iritis itself. The pathologic manifestations have naturally many features in common with other forms; on the other hand, each has its own peculiar or particular distinguishing feature.

CASE 1.—Material supplied by Dr. J. W. Stirling, Royal Victoria Hospital, Montreal.

Mrs. G., aged thirty-five years, married. Active, but poorly nourished, and with a marked family history of tuberculosis. A history of trauma of the right eye fifteen years earlier, the condition of inflammation requiring three months to subside. Present attack had been in progress for three weeks before she decided to consult Dr. Stirling. The cornea was steamy, or semi-opaque, the condition being more intense at certain segments, especially in the deeper tissues. Details of the iris could not be determined, and there was marked pericorneal injection.

There was a slight hypopyon but no acute pain. Later the hypopyon became more manifest, and the infiltration of the cornea more intense, with the presence of what appeared to be deposits on Descemet's membrane. There was a general rise of evening temperature to 99.2°; tension was low.

A paracentesis of the cornea was done, and a clot of organized exudate was removed from the anterior chamber without complication. Rapid progress followed this procedure, all signs of inflammation subsided, and in two days' time she was discharged from the hospital.

The specimen supplied resembled a particle of pus or slough. It was irregular in shape, of a yellowish-white color, and of a firm or solid consistence, not disintegrating when immersed in fluid. It measured approximately 6x2 mm. Sections were made in paraffin.

On examination by low power the section appears as a ribbon-like band, curved as though one side had been in contact with the inner surface of the cornea. It consists for the most part of two types of cells. The structure is of a network of new connective-tissue fibers, which are in fairly close apposition at one or two points, but at others the intercellular spaces are fairly well defined. The stroma of connective tissue is most dense anteriorly, bounding that part of the band the curvature of which would appear to conform to that of the adjacent cornea. Scattered through the stroma are quantities of white blood-cells which are distinctly more numerous as one proceeds backward (Fig 1.).

On examination by higher power one frequently observes that these leukocytes are so numerous as to ccupy the field completely. They are of the small mononuclear or lymphocyte group, although some polymorphonuclears as well as occasional large mononuclear blood-cells are present. At the end of the section behind the anterior stroma of connective tissue the lymphocytes have formed definite tubercles. They are round, and their periphery is bounded by a dense aggregation of small mononuclear leukocytes. The tubercles consist otherwise of large epithelioid cells, which occupy the center of each tubercle. Numerous giant cells are present. (Figs. 2 and 3.)

Although actual necrosis or caseation can hardly be said to have occurred, the cells most centrally placed have begun to show evidences of degeneration, being distinctly shrunken in size and contour. Their cytoplasm stains decidedly less distinctly than the cells more peripherally situated. Several sections were stained for tubercle bacilli, but none could be demonstrated.

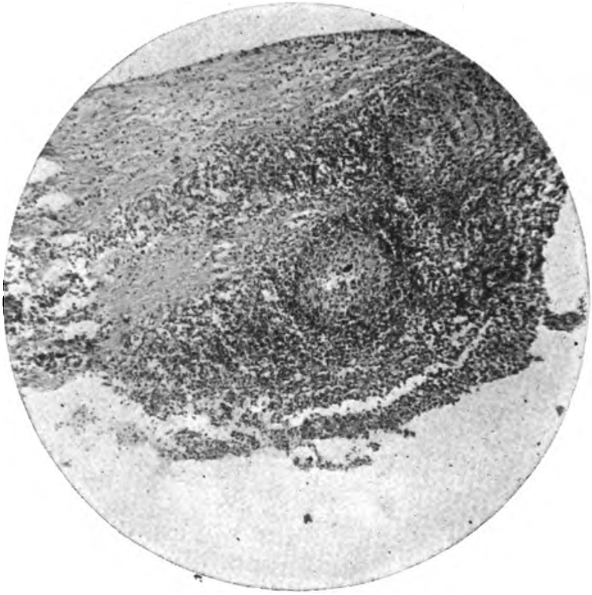


Fig. 1. Case I. Stroma of new connective tissue fibres most dense anteriorly. Scattered thru stroma are innumerable leukocytes and several tubercles best noted in posterior portion of the section (low power).

An especially careful examination was made by high-power magnification for the detection of endothelial cells, which cover the anterior surface of the iris and line the cornea. That none of these cells could be found, and that the section is quite free from pigment cells, with which the iris is more or less infiltrated during chronic inflammation, precludes the possibility that a superficial nodule has sloughed away from the iris and has formed a second focus of inflammation in the anterior chamber. A more reasonable conclusion would be that of a subacute or chronic inflammation of tuberculous origin, where the exudate particularly from the ciliary processes, consisted largely of lymphocytes, later to coalesce and form tubercles, which subsequently break down, rather than to treat of them as pus cells, as found in an acute hypopyon iritis. The action of light, penetrating a moderately clear cornea, may, in a measure, have arrested the progress of the disease in the anterior chamber, allowing a definite encapsulation of tubercules and lymphocytes more anteriorly to take place.

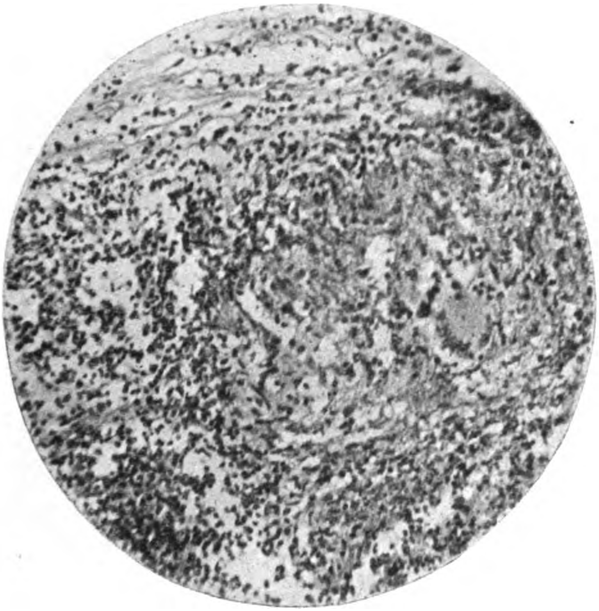


Fig 2. Case I. Section through a tubercle. Infiltration consists mostly of lymphocytes and a few large mononuclear cells and polymorphonuclears. Epithelioid cells and several giant cells also evident (high power).

Case 2.—Material supplied by Dr. Richard Kerry, Western General Hospital, Montreal.

I. R., a young English girl, aged eighteen years, complained of pain and redness of the left eye with intolerance of light. On examination the cornea at first suggested a condition of a superficial interstitial keratitis. There were areas of grayish streaks which tended to coalesce and to become more dense, with apparent roughening of the corneal epithelium. Under palliative treatment the eye became worse, infiltration of the cornea more intense, pericorneal injection more apparent, and the iris studded with a series of small grayish nodules. There were numerous posterior synechiae, the pupil dilating but slightly. There was an associated condition of cervical adenitis, presumably tuberculous; evening temperature, 99.2°.

The anterior chamber was opened on two occasions and iodoform powder introduced; iodoform emulsion was also administered hypodermically. The eye was subsequently enucleated by Dr. Kerry, as it was practically sightless, owing to corneal involvement and to the cataractous condition of the lens incumbent on the generalized posterior or ring synechia of the iris.

The globe was fixed and hardened in the usual way and subsequently embedded in celloidin. The section shows very little evidence of acute or subacute inflammation at the corneoscleral margin, and the vessels are not excessive in number or altered histologically. There is no apparent infiltration about the walls of the blood-vessels, and the corneal epithelium shows no manifestation of edema or areas of exfoliation. Bowman's membrane is intact. Thruout the substantia propria there are innumerable areas of infiltration, which are most numerous near the limbus of the cornea. Each individual area is small, and does not appear to occupy more space than that of the single corneal cell, or at most of two cells. At no point do these assume a rounded or miliary appearance. The infiltration consists for the most part of small mononuclear leukocytes. There is no evidence of giant cells or of caseation in the cornea.

Descemet's membrane shows no presence of punctate bodies on its endothelial surface. There are areas where dense bands of adhesions have extended from the iris to Descemet's membrane, and where the latter has been ripped away by inflammatory bands extending from it to the anterior surface of the iris. These bands consist of inflammatory connective tissue cells, of various forms of leukocytes, in some instances with giant cell association, typical anterior synechiae.

The tear or separation of Descemet's membrane I interpret as mechanical, probably the result of opening the anterior chamber for the introduction of the iodoform. The iris is markedly infiltrated with large and small mononuclear leukocytes, as well as with some polymorphonuclears, to such a degree that details of the iris stroma and of its component vascular arrangement cannot be determined. Definite tubercles are scattered over the anterior surface of the iris, mostly over the pupillary margin. These consist of fibrinous material and of lymphocytes, with occasionally epithelioid cells, and others

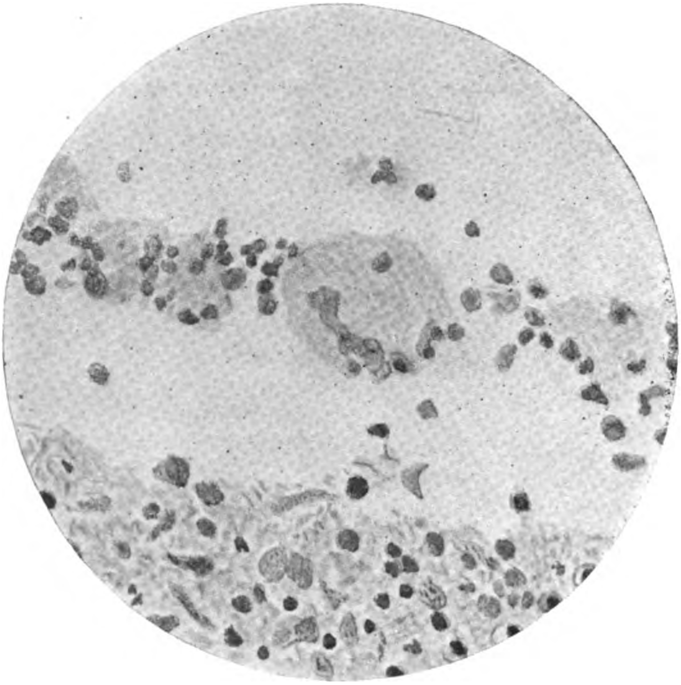


Fig 3. Case I. Practically same as Fig. 2, showing giant cells, leukocytes, fibrinous exudate, and endothelial cells lying free in the anterior chamber. (Oil immersion 1/12.)

in which an early stage of necrosis may be said to have begun. Giant cells are present. There are no evidences of tubercle about the filtration angle, altho one can be detected posteriorly midway between the pupil and the root of the iris (Fig. 4).

The pigment layer of the iris is distinctly disintegrated, and is thrown off into the posterior chamber. It has been collected at certain foci as definite masses, and when plastered down to the anterior lens capsule forms dense posterior synechiae, particularly about what was once regarded as the pupillary margin. At a greater distance from the pupillary margin these synechiae are less dense, and an iris bombe is clearly shown, with occlusion of the filtration angle.

Cataractous changes have occurred in the superficial lamellae of the lens cortex. A mild degree of infiltration is noticed about the ciliary processes, with numerous erythrocytes lying free in the vitreous chamber. The retina and choroid show no associated inflammatory changes. Tubercle bacilli could not be demonstrated in the tissues.

Case 3.—Material supplied by Dr. W. G. M. Byers, Royal Victoria Hospital, Montreal

M. Y., female, single, aged twenty-seven years, consulted Dr. Byers for pain and inflammation in the left eye. She gave a history of the eye having been struck by a splinter of wood a month previously, but it gave her no trouble for three weeks' time. It then became red and she could not stand the light. The patient was a very poorly nourished woman, and altho a physical examination was made, no evidence of a general tuberculous lesion could be found. There was no history of tuberculosis in her family.

There was a small central opacity of the cornea, with considerable hyperemia of the iris. There were numerous

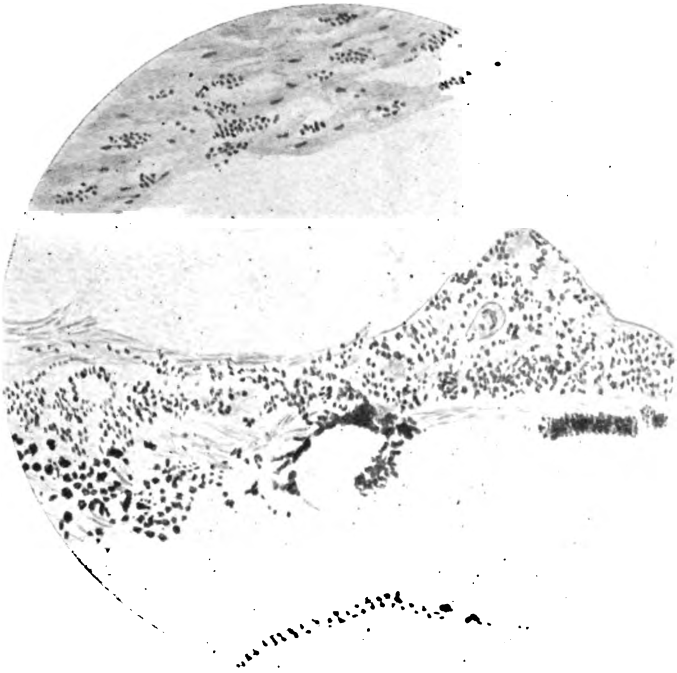


Fig. 4. Case 2. Marked infiltration of iris stroma with lymphocytes. Tubercle formation with giant cell near the pupillary margin of the iris. Pigment layer torn away posteriorly with evidence of its earlier attachment to anterior lens capsule.

deposits on the inner surface of the cornea, apparently mostly central and to the temporal side. The pupil could be kept fairly well dilated. The cornea tended to assume a steamy or edematous appearance, and there was distinct tenderness over the ciliary body. There was no manifestation of tubercles of the iris, but subsequent examination was finally inhibited by a generalized interstitial keratitis.

Approximately one month after admission to the hospital the patient showed marked signs of improvement, although the cornea did not clear up. The evening temperature was 99°, morning 97.3°. She was finally discharged, as she had an opportunity for convalescence in the country.

She was readmitted to the Royal Victoria Hospital two months later with the eye in an acutely inflamed and painful condition. The cornea was completely opaque and somewhat staphylomatous. Central ulceration had taken place, and a definite hernia of Descemet's membrane was evident, measuring less than 2 mm. across. She said that this had burst on more than one occasion. Details of the interior of the eye could not be obtained. The eye was naturally soft, and vision was reduced to perception of light only. There were no changes in her physical condition, and the temperature remained as at last entry. A smear of the conjunctival secretion showed a few Grampositive cells, later staphylococcus albus. The eye was enucleated by Dr. Byers. A von Pirquet reaction subsequent to enucleation was positive.

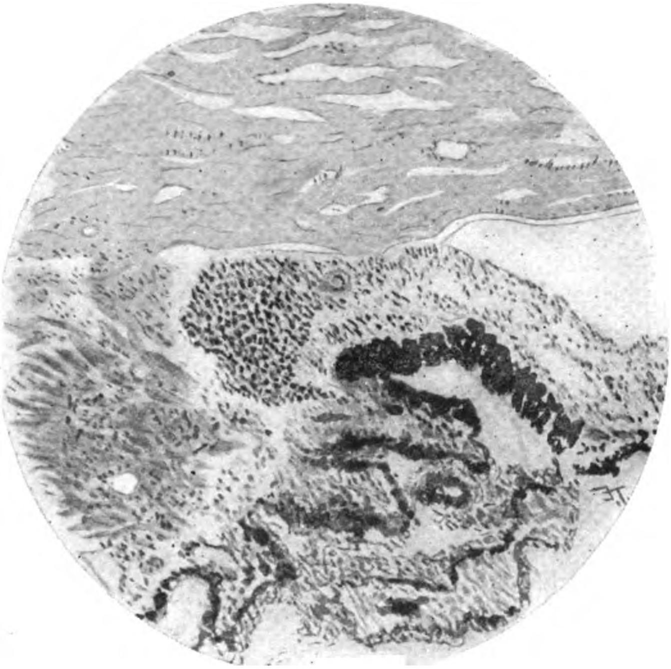


Fig. 5. Case 3. Marked infiltration of iris stroma with definite tubercle formation at root of iris, showing giant cell. Moderate degree of injection of ciliary body with infiltration of leukocytes about the ciliary processes.

On account of the necrotic condition of the cornea, this is the most complicated but by no means the most interesting of the sections. There is a marked condition of superficial as well as of deep injection of the pericorneal vessels. The deep vessels especially show a marked condition of dilatation, with clumps of leukocytes aggregated about the vessel walls.

The superficial layers of the corneal

epithelium are multiplied, and the deeper layers are edematous. The epithelium is distinctly irregular, dipping down into the diseased substantia propria as definite bud or nipple-like projections. Bowman's membrane is intact, but wavy and irregular in its course. Doubtless it is broken in other sections. Directly beneath this the cornea is distinctly vascular—naturally more so at the corneoscleral margin.

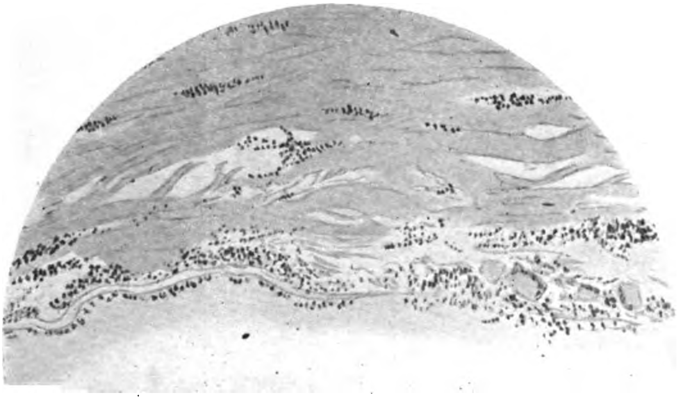


Fig. 6. Case 4. Taken near the filtration angle. Gradual necrosis of Descemet's membrane with groups of leukocytes adherent to its endothelial surface. Above it and between the deeper cells of the substantia propria is a marked infiltration of leukocytes with giant cell formation.

The substantia propria is markedly necrotic, the intercellular spaces being crowded with lymphocytes and with some pus cells. There are tiny blood-vessels in the cornea, the more superficial areas showing a condition of perivasculitis. A definite tuberculous nodule is well seen about the center of the substantia propria, fairly close to the filtration angle, and about midway between Bowman's and Descemet's membrane. It stains somewhat pale at the center, but there is no evidence of necrosis or of giant cell formation. The center of the cornea is distinctly necrotic, being occupied entirely by granulation tissue. The granulation consists of a stroma of amorphous cells in which are included fibroblasts, lymphocytes, and the various elements of a chronically inflamed iris, pigment cells, and a mass of endothelial cells. Descemet's membrane is naturally broken and curled up at the point where the earlier ulcer formed. Where it is intact, numerous aggregations of lymphocytes line its endothelial surface. Numbers of leukocytes and fibrin lie free in the remains of the anterior chamber.

A definite tuberculous nodule with a central giant cell is apparent in the filtration angle, while another is even more evident in the ciliary body of the same side, close to the root of the iris (Fig. 5). The iris is injected and shows small tubercles in the process of formation in its stroma nearer the filtration angle. So much of the iris is necrotic and amorphous, included in the ulcerated process of the cornea, one may reasonably suppose that the presenting portion may have formerly been more extensively diseased. There are, however, no giant cells in the portion of the iris included in the diseased cornea.

The ciliary body is moderately injected, the lining cells of the ciliary processes showing a manifest exhibition of leukocytes attached to their side, while other cells lie free in the neighboring vitreous, at least one forming a distinct clump—the nucleus of a later tubercle. Some of the retinal vessels are distinctly dilated, with perivascular exudate about their walls and with numerous leukocytes, chiefly lymphocytes and polymorphs, within the lumen of the dilated capillaries. A perivascular tubercle is well shown in at least one section. There is only a very moderate degree of infiltration in the stroma of the choroid.

Case 4.—M. M. C., female, single, aged forty-six years, consulted me complaining of pain and loss of vision in the left eye. The condition developed suddenly seven years previously, when she was out of doors, at which time she experienced a sensation as of a grain of sand having blown into her eye. The eye recovered, but broke out with similar attacks on a number of occasions. It became perceptibly worse six months ago, when variations in temperature and bright lights would cause her a great deal of pain and photophobia. She was referred to the Royal Victoria Hospital.

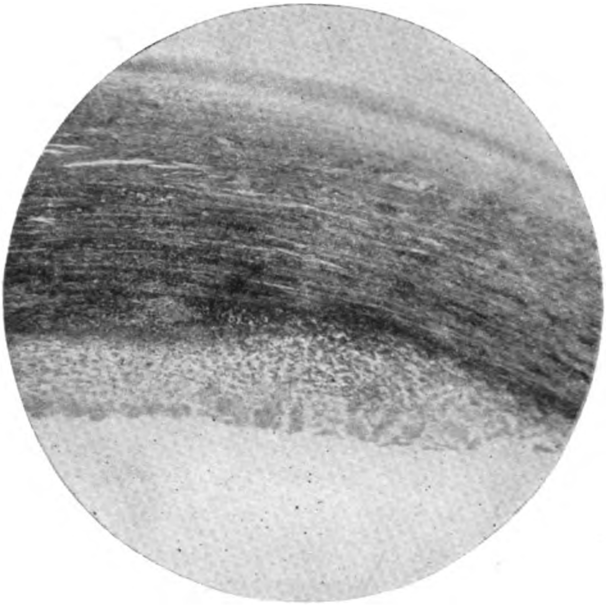


Fig. 7. Case. 4. Intense infiltration of substantia propria, especially the deeper layers. Lowest layer of cells actually necrotic, stain poorly, and innumerable giant cells are manifest (low power).

The patient was an unusually large but neurotic woman. Her previous health and family history were good. There was no evidence of focal tuberculosis elsewhere in the body after a very careful physical examination. The eye was moderately injected, with intense intolerance to light. The iris was discolored and would not dilate to any appreciable extent. There appeared to be no deposit peripherally on the endothelial surface of the cornea. The central portion of the cornea, or that considered as the area covering a moderately dilated pupil, was occupied by a dense, regular, deep seated grayish mass. The condition was diagnosed as a tuberculoma of the cornea, and a diagnostic dose of 2 mg. of T. O. was given. The temperature rose from subnormal to 99.2°, and an acute reaction occurred in the eye. Therapeutic doses of tuberculin emulsion were then proceeded with, starting at 1/20,000 mg., but no improvement ensued. As the eye was practically sightless, and the pain was intensely acute, I enucleated the eye at the patient's request.

There is marked superficial and deep injection about the limbus corneae, the deeper vessels showing a decided infiltration about the vessel walls. The more superficial veins are widely dilated and are filled with red cells. There is no edema of the corneal epithelium. Bowman's membrane is intact and, comparatively speaking, the superficial lamellae of the substantia propria are clear. As one proceeds more deeply there is an intense infiltration of the substantia propria (Fig. 7). This is so evident at the center of the section in the neighborhood of Descemet's membrane that actual necrosis is seen to have occurred (Fig. 8). The infiltration thruout the cornea consists practically entirely of lymphocytes. In the deep layers these have broken down and stain very faintly, constituting what has to be regarded amorphous cellular tissue. Scattered thruout this area are innumerable large giant cells.

Beneath this, at the center of the section, Descemet's membrane is also necrotic and cannot be recognized as such. It is clear, but lined with organized lymph or possibly by proliferated endothelial cells. There are numerous leukocytes or clumps of leukocytes attached to its endothelial surface at the more peripheral parts of the section.

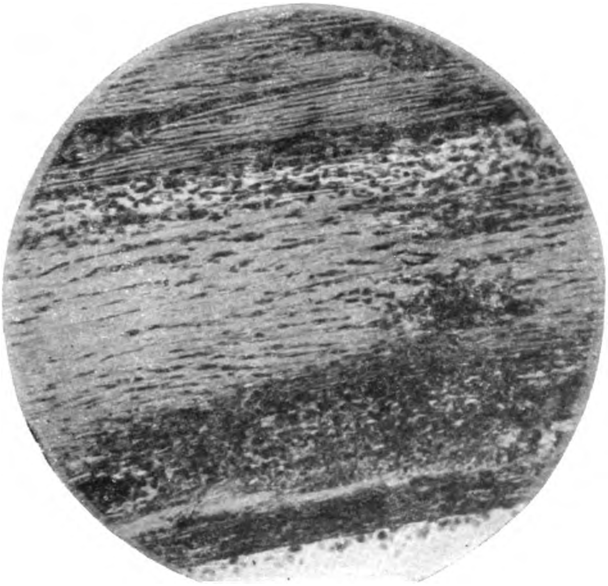


Fig. 8. Case 4. Shows character of infiltrtion of cornea. Deeper layers are actually necrotic, with area of infiltration assuming the form of a tubercle above. Necrosis of Descemet's membrane with marked proliferation of endothelial cells (high power).

The iris is markedly infiltrated and several small nodules can be seen on its endothelial or anterior surface. One nodule practically occupies the filtration angle at one point, while others may be recognized at the pupillary margin. There is no necrosis or evidence of giant cell formation in the iris, but the iris pigment is markedly disintegrated. The iris is intensely injected, and at one point has fallen forward, completely occluding the filtration angle. There is considerable inflammation of the ciliary body, and the more anterior of the choroidal vessels show a decided injection about their walls.

COMMENT.

Parsons classifies tuberculous lesions of the iris as follows: (1) Miliary tubercule; (2) confluent or conglomerate tubercle; (3) tuberculous iritis. The last type may be indistinguishable clinically from other forms of chronic iritis, but microscopically sections reveal tubercle systems or the presence of bacilli.

The four cases just recorded may be considered to fall into the last mentioned class, not only on account of the clinical appearance of the various lesions, but also because of the peculiar chronic nature of each individual case when compared with the more acute lesions of classes 1 and 2. Parsons considers class 3 to be the rarest form of the disease in the iris, and refers to cases of Costa and Prunenda, Edmunds and Brailey, Knaggs, and Kalt. There is generally diffuse infiltration and thickening of the iris. Giant cells may be present, but tubercle systems not necessarily evident. Naturally necrosis with an exhibition of pus in the anterior chamber supports the diagnosis. The demonstration of tubercle bacilli is, naturally enough, conclusive evidence, but the diagnosis is not necessarily excluded on account of the inability of demonstrating the microorganisms. Animal inoculation may be of value. Diagnostic doses of tuberculin, in my own clinical experience, are not always necessarily positive.

Comparing the tuberculous with the syphilitic nodule, the opinion has been that the last mentioned occupies the root of the iris. Our more exact methods of diagnosis, as well as some of the more recent pathologic contributions, make us somewhat more guarded in indorsing such an assertion. For, if the statement be reversed, we note in case 2 of my series that the lesion appears anteriorly near the pupillary margin, but a second nodule may also be detected directed backward, and not far from the root of the iris. In case 3 a nodule is definitely at the root of the iris, and one also in the ciliary body, with a secondary or, more correctly speaking, associated tubercle in the substantia propria. In case 4 the infiltration is so intense that actual tubercle systems cannot be detected in the iris.

It is interesting to record in this regard that within the past three months I have had two patients with iritis developing very suddenly and from no apparent cause. In each case the nodule or nodules of the iris were quite evident about the filtration angle below, and an associated keratitis was present to an alarming acute degree. A Wassermann reaction of the spinal fluid was negative, but a positve reaction, both local and general, to tuberculin, in one case to 0.5 mg., in the other to 2 mg., added confirmation to a suspected diagnosis.

In the syphilitic nodule the iris tissue itself is of normal thickness, and the nodules fade away in the surrounding tissue. They may break thru the surface of the iris and communicate with the anterior chamber. They consist of mononuculear cells embedded in a fine reticulum. As in gummata, giant cells may be found, but rarely caseation. There are widely dilated capillaries within the nodules, while tubercles, on the other hand, are avascular.

No little interest is shown in the discrepancy of opinion as to whether the tuberculous focus in the iris is primary or secondary to a preëxisting tuberculous process. Leber, Fuchs, and de Wecker claim the disease invariably to be a secondary manifestation, while Parinaud, Lawford, Bach and others are as positive of the iris itself being the initial source of infection. In case 1, altho no primary source of infection could be actually pointed out, a very suggestive family history of tuberculosis would make one more than suspicious of a latent tuberculous lesion. Case 2 showed systemic manifestations of the disease in inflamed glands of the neck. Case 3, altho the most suggestive in appearance of all four, showed no actual lesion after careful clinical examination, but exhibited a positive tuberculin reaction after the eye had been removed. Case 4 was an actually robust, heavy woman, but gave a very marked local reaction to 2 mg. of T. O., with a corresponding general reaction.

It is further of interest to note that each of my cases was a female, ages ranging from eighteen to forty-six years. Seven out of eight human cases reported by Stock were also females, the manifestations of the disease appearing still later in life.

One cannot approach an intelligent appreciation of tuberculous iritis without recognizing the painstaking and scientific endeavor manifested in the work of Stock, on the one hand, and of Verhoeff, on the other. The latter has seen fit to disagree with the former in his work on the experimental production of intraocular tuberculosis in animals, Verhoeff preferring to inoculate dead bacilli or the toxins of bacilli directly into the anterior chamber or into some other part of the eye. Stock, on the other hand, preferred a mild dilution of the actual bacilli, which he introduced into the ear veins of rabbits. Altho Verhoeff's technic would at first glance suggest a more benign form of infection, as possibly more comparable with that exhibited in the actual process as it exists in man, yet Stock, by introducing the bacilli at a point away from the eye, allowed for a liberal dilution, also for such inhibition which the lymphocytes and leukocytes might supply. It is further questionable if, when the microorganism reached the eye, the reaction was more violent in the one series of cases than in the other. We must also not overlook the tremendous care and completness of Stock's undertaking. I can vouch for its thoroness, having been with him when part of it was in progress. Forty-eight animals were inoculated, and a careful clinical and pathologic examination, not only local, but also general, was systematically made of each individual case. That the effect of inoculation was not invariably unusually acute is proved by the fact that some rabbits lived up to two years after inoculation. Furthermore, in cases where tuberculous iritis was induced, healing in some instances took place in from two to five weeks.

Stock, from his experimental work on rabbits, has come to the following conclusions: The first symptom manifested is a general thickening of the iris tissue, without any unusual thickening of the blood vessels. Three or four days later small grayish masses appear in the iris tissue. As I have already given it as my clinical and pathologic experience, Stock supports my contention by affirming that there is no such thing as a site of predilection for the tubercle of the iris. It may appear at the pupillary margin, at the middle of the iris, or at the filtration angle. The nodules on healing leave a white spot. Some animals showed a generalized hyperemia of the iris, with the formation of new vessels and a general appearance of granulation tissue. Infiltration may be so intense that solitary nodules cannot be detected. Later there may appear changes in the surrounding tissues, as parenchymatous keratitis, with manifest pericorneal injection of the deep ocular vessels.

Pathologically the nodules, tho possibly having a site of predilection, are more numerous on the posterior than on the anterior surface of the iris. The nodules consist at first of mononuclear leukocytes without any epithelioid cells. Some nodules may reappear over the site of a previously healed tubercle. When left for a long time and allowed to increase in size, one notes in the center of the nodule large mononuclear cells with pale staining nuclei, epitheliod cells. One can only find giant cells in those cases where the process has been active for months, and tubercle bacilli could be demonstrated only in those cases where central caseation of the individual tubercle had occurred.

In the more malignant form, where a parenchymatous keratitis ensued, the iris was generally studded with tubercles. The center of such tubercles was generally necrotic. The sections, especially those from cases 3 and 4, show a distinct disturbance of the endothelial cells of the cornea when a keratitis punctata is instituted at the back of the cornea. In the animals inoculated, as well as in the human cases recorded by Stock, Descemet's membrane always remained intact. Case 4 in my series is rather an exception to this rule or acceptance, where a fairly distinct atrophy or actual necrosis of this membrane may be seen to have taken place. Descemet's membrane behind is densely covered with lymph, and above by a distinct infiltration of lymphocytes and numerous giant cells in part of the cornea suggesting an early necrosis. On the other hand, case 3 demonstrates the absolute obstinacy and resistance of Descemet's membrane, presenting itself forward as a knuckle or hernia or descementocele after an actually complete ulceration of the substantia propria has taken place. The resistance of this form of a hyaloid membrane is quite comparable to that already pointed out by me in the case of the membrane of Bruch in cases of tubercle of the choroid. The whole cornea may be diffusely infiltrated, and new vessels may encroach upon the corneal tissue. There is a circumscribed nodule formation in the cornea itself, as well as about its margin.

An infiltration of the cornea is the rule rather than the exception in my experience. The ciliary body is not of necessity always acutely involved in the disease process. In gross involvement of the iris one may find large or small tubercles of the ciliary body. Stock was unable to find the same pathologic manifestations in animals as one would expect to find from clinical observations in the human.

This article would be far from complete were I not to attempt to acknowledge the important scientific work done by Verhoeff. His contribution on animal inoculation, as well as his reports on human tuberculous eyes pathologically examined, is more or less restricted in comparison with Stock's work. But his general approach of the subject and his astutely scientific interpretation of the possible transmission of the disease is more than on a par with the work of earlier writers. By introducing dead bacilli into the vitreous, or, for that matter, into the anterior chamber, he has shown that in several weeks, or even months of time, there may be produced nodules in the corneosclera closely simulating those of sclerokeratitis, as is manifested clinically in man. These have been manifested in a naturally modified form in all my cases, with definite lesions in the iris and ciliary body, and also in the retina, as I have been able to demonstrate in one case. In the case of a marked involvement of the cornea little reaction may be apparent in the ciliary body, a condition attributed to the fact that live bacilli, even tho of an attenuated virulence, will find the cornea and sclera more suitable for their proliferation owing to their avascular nature. The cornea is more involved in experimental work on animals directly inoculated, while the reverse is the case in man. This is as one would suppose or expect—in the one case the inoculation is almost direct thru the medium of the anterior chamber, in the latter instance it is indirect thru the venous capillaries of the uveal tract.

Verhoeff makes the statement that in his experimental cases the size and number of the lesions were greater at the filtration angle than elsewhere, showing that more bacilli lodged there. One might offer as an explanation the fact of the prevalence of tubercles of the iris occurring close to the filtration angle as borne out by Stock, as well as by myself. Sections from the cases which I am presenting do not necessarily always substantiate this fact, altho acknowledging the almost constant association of corneal involvement with tuberculous iritis. In the cases here recorded the iris itself is more involved than any other part of the eye. Furthermore, we notice in this series, as well as in the cases which I have had an opportunity of studying clinically, that the lesion in the cornea is more often opposite the pupillary area than about the filtration angle and ligamentum pectinatum. One may explain such a condition by the fact of the toxins ultimately reaching that part of the cornea with the most stagnant supply of lymph, as one notices in any form of interstitial keratitis. Further, the aggregation of lymphocytes, with the attendant bacilli, are drawn directly from the posterior chamber thru the pupil to the anterior chamber. From albuminous changes in the aqueous and consequent alteration in its specific gravity these lymphocytes, instead of falling down into the filtration angle, fall more directly forward. Such a condition of so-called punctate keratitis, tho not perhaps an actual source of infection, has at least an influence in inhibiting nutrition from the aqueous, which we are led to believe supplies Descemet's membrane and the posterior layers of the cornea. These layers, with Descemet's membrane, are in consequence attacked from both sides. This interpretation has been shown to be more than a probability in cases 3 and 4.

There was evidence of an active or acute inflammatory condition in the choroid in one case only—case 4. Case 3 shows what might in time have developed into a retinal tubercle—a widely dilated vein filled with numbers of leukocytes, many, strangely enough, being of the polymorphonuclear type. There is distinct evidence of the migration of blood cells thru the vessel walls and of the formation of an early tho definite perivascular tubercle. Verhoeff, in his work, very properly supposes or suggests the probability of the infection, particularly as applied to the corneosclera, as coming from the lymphocytes escaping from lesions occurring in the choroid, retina, or ciliary processes. These clumps of cells, actually nascent tubercles, find their way thru the pupillary area, later to attack the cornea and corneosclera thru the ligamentum pectinatum. The infection is consequently direct and not one of metastasis.

In a former contribution which I had the honor of presenting before this society I attempted to show how, in cases of tubercle of the choroid, the condition extended thru the bloodstream. The migration of lymphocytes thru the vessel walls and the subsequent formation of a perivascular tubercle were demonstrated not only in the vessels about the base of the brain, but also in the pial capillaries extending into the vaginal space about the optic nerve. What is true in the acute form of the disease may, I claim, be equally true in the more chronic phase, tho from its mere chronicity not so easily demonstrable. One may thus account for tubercles found free in the vitreous, about the ciliary processes, in the choroid, and even in the more anterior portion of the retina in tuberculous iridokeratitis.

My observation in cases 3 and 4, while maintaining that the infection of the cornea is due to toxin and is endogenous, may still support Verhoeff's maxims. The aggregation of lymphocytes, or, what I have formerly termed them, nascent tubercles, after reaching the aqueous may find their way to the filtration angle and thru the ligamentum pectinatum, the toxins, or possibly the actual bacilli, to be taken up by the pericorneal lymph capillaries. A condition of parenchymatous keratitis may exhibit actual tuberculous elements other than ordinary manifestations of interstitial inflammation. I do not consider that the necrosis of Descemet's membrane in case 4 has resulted from direct apposition of tubercle upon its endothelial lining, any more than I have been able to demonstrate a diseased process in the membrane of Bruch in the acute form of the disease involving the choroid. My opinion is that a deep interstitial keratitis must first be present, with subsequent necrosis and doubtless with actual bacilli present rather than toxins. Case 3 supports this opinion, as well as the large series of cases prepared by Stock, who was unable to demonstrate a single case of initial necrosis of Descemet's membrane. Compared with his exhaustive series, both comparative and human, my own exception in case 4 would appear as a unique condition.

REFERENCES.

Costa and Prunendà: Arch. f. Ophthal., xxvi, 3, 1880.
Edmunds and Brailey: Trans. Ophthal. Soc. United Kingdom, 11, 1882.
Kalt: Societe de biologie, 1893.
Knaggs: Trans. Ophthal. Soc.. United Kingdom, xii, 1892.
Lawford: Royal London Ophth. Hospital Reports, xii, 1888.
Leber: Bericht der Ophthal. Gesel., 1893.
Parsons: Pathology of the Eye, 1, p. 295.
Parinaud: Societe de chirurgie, 1879.
Stock: Graefe's Arch. f. Ophthal., lxvi, Band 1, Heft.
Tooke: Trans. Amer. Ophthal. Soc., 1915.
Verhoeff: Archives of Ophthal., xlii, No. 5, 1913. Jour. Amer. Medical Assn., xliii, pp. 13-19.

HEREDITARY CONGENITAL PTOSIS WITH REPORT OF 64 CASES CONFORMING TO THE MENDELIAN RULE OF DOMINANCE

H. H. Briggs, A. M., M. D.

ASHEVILLE, N. C.

This account of hereditary ptosis reporting a large family extending to six generations is slightly abridged from a candidate's thesis presented to the American Ophthalmological Society.

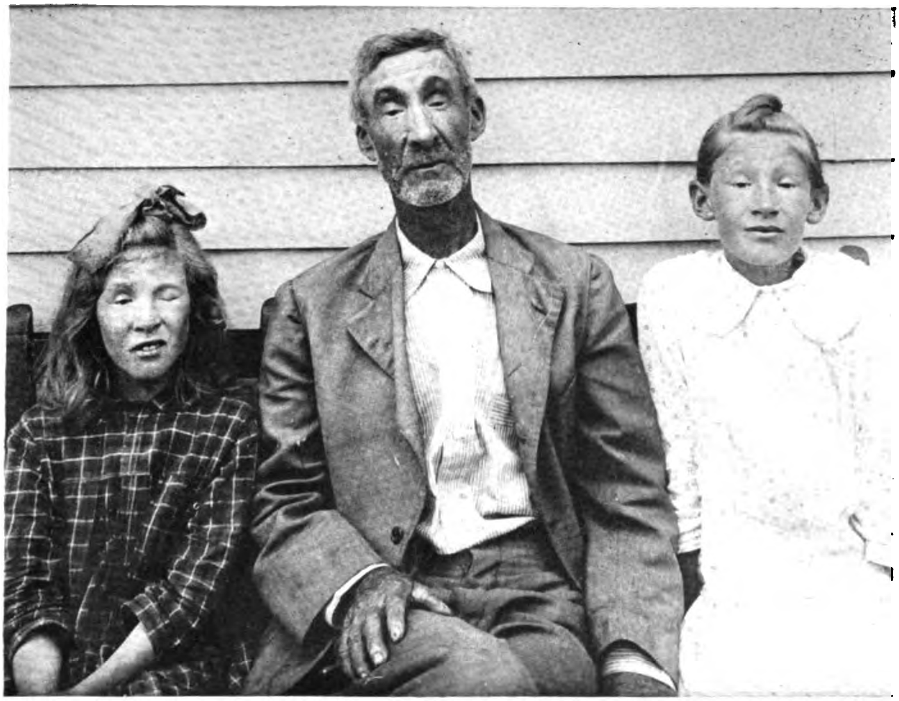
Near the summit of the Great Smokies, in western North Carolina and eastern Tennessee, on the head waters of Laurel and Nolichucky rivers, have lived for more than a century the strong, sturdy, and virile descendants of one Martin Maney, an emigrant from Dublin, Ireland, a veteran of the Revolutionary War, and one of the first pioneers to cross the Blue Ridge and brave the dangers of mountain wilderness and the Indians of those times—strong and sturdy, as evidenced by their ability to cope with the vicissitudes incident to pioneer life, and prolific, as shown by their large families —18 children in one, 10 to 14 in four, and 28 resulting from the union of one man (No. 17*) to three wives—15 to the first, 2 to the second, and 11 to the third.

Until recently these simple, poor, yet honest mountain people, isolated from railroads and thoroughfares, have lived in this sparsely settled country, where the high altitude, pure water, abundant sunshine, and the many other natural resources are conducive to happiness, longevity, and prolificity. Being content with their natural environment and with their innate love for the mountains, they have not cared to migrate into more populous centers, and on account of their segregation it has been possible to construct an accurate family tree, and to study the condition of hereditary congenital ptosis in many of the 64 cases recorded.

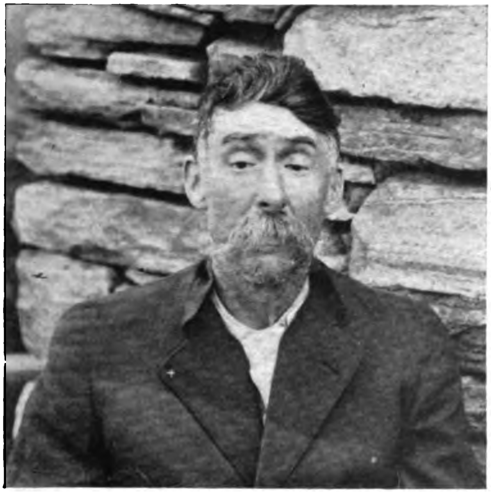
Case 1.—W. H. (No. 26), aged fifty-one years, farmer, in good health, has double ptosis, but no other evidence of physical or mental degeneration. Forehead greatly wrinkled, especially on right side. Eyebrows standing high. Width of nose, as between nosepiece of eye-glasses, 6 mm.; distance between inner canthi, 29½ mm.; distance between bridge of nose and inner canthus, 11¾ mm.; width of palpebral fissure, 24 mm.; diameter of cornea, 7½ mm.; distance from cornea to inner canthus, 8 mm.; pupillary distance, 55 mm. Upper lid shows no wrinkles, and covers the upper part of the pupil, necessitating constant action of the occipitofrontalis, and tilting of the head backward, in order to fix objects above the horizon. Patient able to superduct eyes, but this to only a limited degree. No other extraocular muscle impairment or imbalance; no pupillary reflex

---

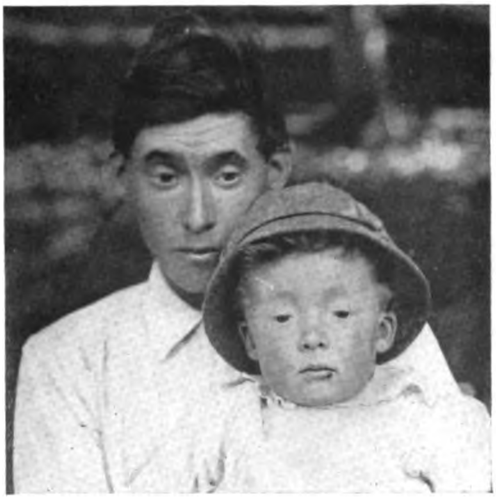
*Only 18 of the 28 offspring appear on the family tree because of lack of data concerning remainder.



112 58 113



26



68 124

CASES OF CONGENITAL PTOSIS (BRIGGS)

disturbance nor impairment of the ciliary muscles save that due to presbyopia. When thumbs were pressed firmly against the eyebrows, so as to prevent the associated action of the occipitofrontalis, patient was unable to raise the lids showing total impairment of each levator. Refraction: V. R. E.=0.8, with sph.+0.50○cyl.+0.75 axis 15°=1; L. E.=0.8, with cyl.+0.75 axis 165°=1. Presbyopia, 1.50 D.

Patient states that he has never had any trouble with eyes except that due to the ptosis, which is borne out by the fact that he still uses an old cap and ball rifle for squirrel hunting. The patient's son (No. 68), grandson (No. 124), mother (No. 11), grandmother (No. 3), and great-grandmother (No. 1) were similarly affected.

Case 2.—G. H. (No. 68), aged twenty-five years, son of W. H., resembles in general stature his father, and has about the same amount of ptosis, but is the more able to correct the deformity by the associated action of the occipitofrontalis. Position of head slightly back. Patient able to superduct eyes, but this to only a limited degree. No other extraocular muscle impairment or imbalance; no pupillary reflex disturbance nor impairment of the ciliary muscles. Deep furrows in forehead, due to muscular attempt to raise lids. Width of nose opposite inner canthi, 11 mm.; distance between inner canthi, 35½ mm.; diameter of cornea, 7½ mm.; pupillary distance, 61 mm. Can lift upper lids slightly above pupil, but, as in case of the father, has no lifting power of upper lids when the action of the occipitofrontalis is checked by pressure over the eyebrows. Can turn eyes upward when lids are lifted, but this action is slightly impaired. Vision each eye, 1. No marks of degeneration.

Case 3.—C. H. (No. 124), son of G. H., four years old, slightly undeveloped. Has marked ptosis. Upper lids hang below upper margin of pupil, necessitating extreme backward position of head in attempting to fix objects in horizontal field. Small wrinkles in forehead, indicating auxiliary action of the occipitofrontalis. No other extraocular muscle impairment or imbalance; no pupillary reflex disturbance nor impairment of the ciliary muscles. On lifting eyelids with fingers, patient is unable to lift eyes above the horizontal meridian, indicating impairment of the superior recti, but since his father, aunt, and grandfather possess this power of superduction, it is probable that this function will be acquired in later years. Base of nose very broad, measuring 20 mm., compared to 6 mm. of the grandfather and 11 mm. of the father. Distance between inner canthus and side of the nose, 9 mm.; width of palpebral fissure, 20 mm.; height of palpebral fissure, 6 mm.; pupillary distance, 52 mm. Unable to determine vision, but no evidence of defect.

Case 4.—Mrs. McK. (No. 70), aged twenty-three years, daughter of W. H. (No. 26), has the least amount of ptosis observed in any of the genealogy. Has very narrow nose, like her father; eyebrows highly raised; the skin over the forehead corrugated on account of the contraction of the occipitofrontalis in an effort to assist the levator. Ptosis more marked in the left. On exerting pressure over the supraorbital region, preventing action of the frontal portion of the occipitofrontalis, patient still able to slightly raise the upper lid, showing that the action of the levator in this case is only partially paralyzed. The lacus lacrymalis is very broad vertically, extending downward, inward, and forward. Distance from inner canthus to the side of nose, 8½ mm.; distance between inner canthi, 36 mm.; width of palpebral fissure, 23 mm.; vertical width of palpebral fissure, 6½ mm.; pupils, in moderate light, 3½ mm.; crest width of nose, 14 mm.; pupillary distance, 64 mm. On looking straight forward, upper lid covers upper part of pupil. On attempting further upward motion the occipitofrontalis is called more and more into action. Vision above 20 degrees impossible without bending head backward.

Case 5.—Male infant (No. 81), six weeks old, in splendid health, has very marked ptosis. There is no evidence of action of the occipitofrontalis as an auxiliary aid to the levator, and, as the levator has no action, the lids scarcely separate, there being perhaps about 1 mm. opening. Palpebral fissure very narrow to the extent that blepharophimosis exists. Lifting upper lids causes immediate photophobia, but reveals eyes normal in appearance. Unable to test extrinsic muscles, but no evidence of their impairment.

CASE 6.—(No. 111.) Girl, aged fifteen years, in good health, moderate amount of ptosis; total impairment of function of levators. Has congenital contraction of the subcutaneous tissues over the malar, or attached to same, drawing the lids to the outer canthus, especially the lower, far away from the eye. This contraction of the lower lid stretches the lower canaliculus, misplacing the lower punctum 7 mm. from the inner canthus, and gives a general appearance to the eyes of convergent strabismus, but this is only apparent, as there is no muscular imbalance. There is a chronic granular condition of the lids, due to their exposure, and the cornea in the lower outer quadrant, for the same reason, is roughened, rendering the vision 0.5 in the right eye, that in the left being normal.

The six cases above reported represent the fourth, fifth and sixth generations. Cases Nos. 81 and 124, infants in the sixth generation, have seemingly an equal if not a greater amount of ptosis than had case No. 26 or case No. 58 in the fourth generation, or of any shown in any of the photographs, which would indicate that the degree of ptosis remains constant, and is at least not becoming diluted.

SUMMARY.—The cases of hereditary ptosis herein recorded are members of a genealogy extending thru six generations over a period of one and one-quarter centuries. Inheritance in every case is direct, no generation in the lineage of the affected being skipped except in the one instance, Case No. 125, in the sixth generation, whose mother, No. 90, a member of the genealogy, is said to be normal, and to have married one who was also normal.*

Twenty-three families are represented, in 17 of which the father, and in 6 the mother, transmitted the malformation. In no case did affected parents fail to transmit ptosis to one or more of their offspring.

There was only one case of intermarriage,† and that between affected female No. 43, in generation four, to a normal male, second cousin, No. 109, in generation five. Of the two male offspring, one was affected and the other normal.

Of the 128 members of the genealogy composing the 23 affected families, 64 were affected with ptosis and 64 were normal; 74 were males, 53 females, and one of unknown sex. An equal num-

Generation	Number Members			Affected			Normal			Affected Parents		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
I	..	1	1	..	1	1	..	..	..	..	1	1
II	1	2	3	1	2	3	..	..	..	1	2	3
III	13	8	21	6	4	10	7	4	11	5	1	6
IV	27	15	42	16	7	23	11	8	19	9	1	10
V	31	25	56	9	16	25	22	9	31	2	1	3
VI	‡4	2	7	‡2	..	3	2	2	4	..	..	..
Total	‡76	53	130	‡34	30	65	42	23	65	17	6	23
Enumerated twice	2	..	2	1	..	1	1	..	1	..	..	..
	74	..	128	33	..	64	41	..	64	..	..	..

‡ One sex unknown.

---

*Information gained from relatives.

†Mountain people seldom intermarry.

ber (64 of each), were affected and normal. Of the affected, 33 were males, 30 were females, and 1 of unknown sex, while of the normal, 41 were males and 23 females.

Of the twenty* affected parents, 16 were males and 4 females. Of the 121 offspring (71 males and 50 females), 61 were affected and 60 normal. The 16 fathers had 100 children (62 males and 38 females), to 47 of whom they transmitted ptosis, there being 53 normal. The four mothers bore 21 children (9 males and 12 females), of whom 14 had ptosis and 7 were normal. Of the offspring, 61 had ptosis and 60 were normal, the fathers' share was 47 ptosis to 53 normal, while the mothers' was 14 ptosis to 7 normal. Of the 71 male offspring, 62 were from affected fathers and 9 from affected mothers, while of the 50 female offspring 38 were from affected fathers and 12 from affected mothers.

	Parents	Male	Female	Ptosis	Normal	Total
Fathers ...	16	62	38	47	53	100
Mothers ...	4	9	12	14	7	21
	20	71	50	61	60	121

Literature.—Ptosis unaccompanied by motility defects of the eye is seldom seen. Epicanthus and impairment of function of the superior rectus most frequently exist, yet paralysis of each and all of the extrinsic muscles has been noted. In no case found in the literature has paralysis of the intrinsic muscles of the eye been a complication of ptosis, except in complete ophthalmoplegia. Disturbance of the pupil and accommodation are, therefore, practically never seen associated with ptosis.

Hirschberg[17] found a case of ptosis accompanying total ophthalmoplegia in a child whose mother and grandmother were similarly affected. Schiller[35] reports father and two sons having ptosis with paralysis of all the outer eye muscles. Horner[19] reports inherited ptosis through three generations of one family, and in nine brothers of another family, associated with impairment of the superior rectus. Rampoldi[33] reports ptosis in father, son, and daughter, with immobility of the extrinsic muscles and slight astigmatism. Daguillon[9] reports congenital hereditary ptosis with divergent strabismus, congenital hereditary myopia, and amblyopia. Lawford[25] reports ptosis in father and three sons among seven children, immobility of the eyes in the vertical meridian, with only slight amount of mobility to the side. Horner[19] reports cases of ptosis in several generations of the same family. Heuck[16] reports ptosis in mother, two sons, and one daughter, in which the eyes were directed downward and easily converged. There was complete loss of function in the superior and inferior recti, while the other extrinsic muscles functioned. There was also deficient vision. Hirschberg[17] reports ptosis in a mother, daughter, grandson, and great-grandson, with impairment of superduction, abduction, and adduction. In the grandson, epicanthus, superduction impossible, and divergence alternating with convulsive convergence. Vignes[43] gives cases of ptosis and epicanthus in grandfather, five sons, and one daughter of 11 children. He also reports ptosis in a father, two sons, and one daughter of 5 children. Vossius[44] gives history of two brothers with impossible movement of the eyes in the vertical meridian and dimness of vision. Ginestous[12] reports child of twenty-five months showing incomplete ptosis, epicanthus, and paralysis of the superior rectus. Ahlström[1] reports case of ptosis and ophthalmoplegia externa in a fifteen-year-old boy, and history of several relatives similarly affected. Guende[15] reports three brothers in family of nine children with ptosis complicating ophthalmoplegia externa. Dujardin[11] reports maternal grandfather, mother, and four daughters having ptosis with immobility of the eyes upward and downward and limitation of lateral movements. Schiler[35] reports ptosis in grandfather, father and son, with immobility of the outer muscles, high hypermetropia, and a dot-like darkening of the lens. Gourfein[14] reports ptosis in grandfather, father, and four sons, the female members of the second and third generations remaining healthy. Movements of the eyes always accompanied by rotary nystagmus. They also showed amblyopia, changes in the optic nerve and the retina, flattening in the region of the eyebrow. Ayres[4] reports grandfather and uncle with immobility of all eye muscles. Paul Bloch[7] reports two brothers having paralysis of the abducens and ptosis.

---

*Leaving off the progenitor, father of No. 1, parents who intermarried, and No. 90 (mother of S), from total number of parents.

Steinheim[39] reports ptosis and epicanthus in five generations. The great grandfather had ptosis. Of his five children, two males and one female were affected. One male and one female married and moved to America, no more being known of their descendants. The other male married, had two daughters, one normal and one affected; the latter becoming the mother of five children, of whom two males and one female were affected. Of the girl's children two were normal and one affected. Of the two males, one became the father of two normal and two abnormal children, while the other was father of three abnormal and three normal offspring.

Hüttemann,[21] in 1911, reported 11 cases of congenital hereditary ptosis and epicanthus in three generations of the same family. He notes that in all these there was a peculiar lid movement associated with lateral movement of the eyes. In a glance to left the right eye, and on looking to the right the left eye, was almost closed.

Dujardin[11] reports five cases of congenital ptosis in grandfather, mother, and three daughters, the fourth daughter being normal. One of the affected daughters had partial ophthalmoplegia.

H. P. Stuckey[40] reports father, son, and three grandsons living in northern Georgia having ptosis, one daughter being normal. These are Nos. 25, 64, 65, 66, and 67 of the genealogy of the author's cases. He considered it a probable example of Mendelian recessive. The inheritance is, however, dominant in character, as is amply illustrated in the extensive family tree.

F. R. Spencer[37] reports a case in a man of twenty-seven who gives history of ptosis since fifteen or sixteen years of age. He thinks it has gradually increased since that time, but has been much worse for the past three years. His mother, maternal grandmother, two maternal aunts, and one brother were similarly affected. His younger brother's lids began to droop at the age of twenty-two years. His mother had great difficulty in raising her lids. His abduction, adduction, superduction, and subduction were very limited, and he was unable to raise either eyelid without the assistance of the frontalis muscle.

Pathology. — Operations, autopsies, and microscopic examinations have revealed the following condition as causes of ptosis:

(*a*) Defective development of levator and other muscles of the eye. Heuck[16] found a partly developed levator measuring only 2 mm. in breadth. Bach,[5] in a case of bilateral congenital ptosis and limitation of the eye movements upward, found defective development of levator and moderate atrophy of superior rectus; the nuclear region of the oculomotor was normal.

(*b*) Adhesion of Muscles.—Albers and Wrisberg[2] found in a case of ptosis adhesion of the rectus superior with the levator; the external rectus was adherent to the inferior rectus, and the internal rectus to the superior oblique.

(*c*) Abnormal insertion of muscles was found by Rossi,[34] Heuck,[16] Dieffenbach,[10] Pflüger.[32] In some of the cases the superior rectus was found inserted back of the equator.

(*d*) Connective-tissue bands instead of muscles were found by Ahlström[1] in cases of congenital ptosis. When he laid bare the tarsal border in the left eye, no trace of the levator tendon was seen, and in the right eye only a few scattered tendon fibers were found.

(*e*) Absence of Muscle.—Lawford,[26] in a case of ptosis with divergence, found the rectus internus absent. Ahlström[1] found no trace of the levator, and Heuck[16] reports finding the same condition. Horles[18] reports a case of ptosis in which both obliques were lacking, the recti being normal. Seiler[36] found a case of ptosis in which the inferior oblique and superior rectus of the right eye and the inferior oblique of the left eye were lacking. In another case the superior and inferior obliques of the right and the superior and inferior obliques and superior rectus of left were not found.

Steinheim,[38] in a case of congenital ptosis with defective motion of the eye, failed to find the superior rectus.

Etiology.—The etiology of ptosis leads back to the question of the cause of variation, and has been defined as the event which brings about the addition or omission of a factor. It is due either to absence of the factor for the normal development of the levator, or to the presence of an inhibitor to normal development.

Intermarriage, certainly in the last six generations, has not been a factor in the heredity of ptosis in this genealogy. Of the 128 offspring whose histories have been studied, there has been but one intermarriage, that between the affected female (No. 43) in the fourth generation and her second cousin, normal (No. 109) in the fifth generation. From this union resulted one normal male, three years old, and one male six weeks old.

There is one other instance of intermarriage between female (No. 36) and son of No. 21, who was grandson of No. 4, abnormal, two generations removed, and consequently not included in the numbered offspring. This union resulted in all normal.

It is very difficult to determine the exact anatomic cause of the anomaly. Because of their anatomic situation, it is impossible to test the muscles of the eye electrically. Koster[23] reasoned that, if the enlargement of the palpebral fissure is considered, the levator muscle of the lid exists but is paralyzed or atrophied. Since the tarsal muscle of Müller is inserted in the lower part of the tendon of the levator, if the latter is lacking, the tarsal muscle has no point of insertion and cannot raise the lid under the influence of cocain. Cocain, therefore, reveals the absence or presence of the levator. The use of this method in the author's cases examined, resulted, so far as revealing a cause, negatively.

The author thus far has not had an opportunity of operating on any case of ptosis in this genealogy, or to note the exact pathologic cause of ptosis at necropsy. He hopes, however, to operate on case No. 111, and to soon make a supplemental report of the findings.

Diagnosis.—Ptosis is either congenital or acquired, and these again may be subdivided according to the causes which produce it. It may also be unilateral or bilateral. Although some hereditary eye diseases, such as certain forms of cataract (Nettleship[31]) which occur in middle life, are not congenital, all cases of hereditary ptosis are congenital. In other words, hereditary ptosis is prenatal, manifesting itself at birth and continuously. In hereditary congenital ptosis, which is usually bilateral, there may be absence or deficiency of the levator often associated with absence or deficiency of one or more of the extrinsic muscles of the eye, most frequently the superior rectus, and most frequently of all it is associated with congenital epicanthus. There may be absence or deficiency of that portion of the third nerve supplying the levator. It is sometimes associated with sympathetic movements of the lower jaw, increasing in degree when the eye is abducted, and disappearing when it is adducted, the lid in these cases constantly retracting involuntarily when the jaw is moved to the opposite side of the ptosis (Bradburn[8]).

On the contrary, in an acquired ptosis there is usually to be found an affection of the lids, such as hypertrophy, edema, new-growth, blepharochalasis, and ptosis adiposa. It may result from trauma to the levator, or atrophy, as occurs in women of middle life, or as an early symptom of chronic progressive opthalmoplegia and myasthenia gravis. It may result from a central or cerebral degeneration. When due to a cortical lesion, it would probably be unilateral, and the only eye lesion, the other branches of the oculomotor nerve being unaffected. A nuclear lesion of the pons might produce such a lesion (Bradburn[8]). Ptosis, as a symptom, may result from constitutional diseases, such as myasthenia gravis, locomotor ataxia, toxic processes, chronic progressive ophthalmoplegia, hysteria. Acquired ptosis may also occur from nuclear, fascicular, or basal lesions, from sphenoidal abscess and orbital lesions, and from affections of the sympathetic nerve.

The author's cases of ptosis are unique in that in no case is the ptosis complicated by any other motility defect except in the infant (No. 124), whose superior rectus did not function, and this probably not because of any defect in the muscle itself or impairment of its nerve supply *per se*, but on account of the drooping of the lid the superior rectus had never been called upon to turn the eye upward. When the child was asked to look at an object held above his horizon, he invariably tilted the head backward until the visual plane met the object, and this he did even when the lids were lifted by the observer. Observation of the eyes during sleep or under general anesthesia might have determined whether or not superduction was possible, but such opportunity was not offered.

In case No. 59 it was demonstrated that the levator had a certain amount of function, but in no other case examined could function of the levator be demonstrated.

Mendel's Theory.—The Mendelian phenomena are well illustrated in peas, mice, rabbits, poultry, and snails. Certain defects: hornless cattle—polled angus, earless sheep of China, tailless cats of Japan, short-tailed dogs and pigs are also examples of Mendelian phenomena. That we do not find more examples of Mendelian inheritance in man is due to the fact that the inbreeding necessary to bring out Mendelian segregation is not sufficiently close in man.

The eye and its appendages are subject to more hereditary diseases and malformations than in any other organ, due partly to the great number of histologic and anatomic structures concerned in its makeup, and partly to its many complicated and coördinated physiologic functions, which are so easily disturbed. Of ophthalmic disease most frequently transmitted may be mentioned: ptosis, epicanthus (Manz[27]), distichiasis, nodular and reticular opacities, corneal staphyloma, aniridia, coloboma of the iris, corectopia, cataract (Nettleship[31]), ectopia lentis, glaucoma, retinitis pigmentosa (Leber[26]), and other retinal degenerations, night blindness, nystagmus, color blindness, albinism, motility defects and errors of refraction. Of these, those showing the most marked evidence of transmission are cataract, night blindness, and motility defects, including ptosis. Most of the transmitted defects of the eye follow Mendelian rules, and, with the exception of those which are sex-linked, as color blindness and stationary night blindness, are *dominant* to the normal.

In order to discuss more intelligently the inheritance in the cases of ptosis herein reported, let us recall briefly the salient points of the Mendelian theory.

Gregor Mendel,[28] in 1865, experimenting with the edible pea (pisum sativum), took a pair of characters, tallness and shortness, and crossing the tall variety of six feet with the dwarf of one foot, it was found that the first cross-bred variety, F 1, were all tall. From the fact that the character tallness appeared in all the cross-bred, to the exclusion of the opposite character, dwarfness, Mendel called it a *dominant* character, and dwarfness, a *recessive* character. The tall, cross-bred by self-fertilization, bore seeds which produced a mixed generation, F 2, many being tall and some being short, like the tall and short grandparents, respectively, and in the ratio of about 75 per cent. tall and 25 per cent. short. The F 2 plants were again allowed to self-fertilize themselves, and it was found that the dwarfs (recessives) produced dwarfs entirely, and that further propagation of these produced pure recessives. But the tall, F 2, dominants, produced (instead of all dominants as the dwarfs produce recessives) two kinds: (*a*) plants of mixed F 3, consisting of tall and dwarfs in the proportion of three to one respectively, and (*b*) plants which gave tall only, and are those pure to tallness; the ratio of the impure (*a*) plants to the pure (*b*) being two to one. The F 2 generation dominants was composed, therefore, of three kinds of plants:

3 { *Dominants*, pure, 25 per cent.
  { *Dominants*, impure, 50 per cent.
1 { *Recessives*, pure, 25 per cent.

Mendel found similar inheritance as above noted when all the other distinct characters in peas were used, the dominant character being shown in italics as follows: *Tallness*—shortness. *Flowers along axis* of plant or on top of plant. *Green color of unripe body*—yellow color of pods. *Shape of body inflated*—constricted between seeds. *Red seeds*—gray or brown. *Yellow cotyledons*—green. *Round seeds*—wrinkled.

Segregation and allelomorphism. Tallness (D) and dwarfness (R) (Bateson[6]) entered in the fertilized ovum in the original cross, but since the next generation showed some tall and others dwarfs, there must have been a separation (segregation) of the two characters in the process of the germ formation in the fertilized ovum (zygole) of the two characters, the segregated characters being called allelomorphic. This was shown in crossing F 1 with pure dominants and pure recessives. D R multiplied by D D gave all dominants in appearance, although composed of D R and D D plants equal in number on the average. On the other hand, D R multiplied by R R gives an equal number of dominants and recessives; the dominants being D R and the recessives being all pure recessives. This ratio of one to one, which results from D R multiplied by R R, will be referred to later in relation to the inheritance of ptosis.

If the character ptosis is dominant, the normal being recessive, there should be, in the aggregate, approximately the same number of affected and normal offspring. There were found 64 cases of ptosis and 64 normals, which conforms with mathematical precision to the rule of dominance.

In this connection it is interesting to compare the ratio of affected and normal in cases of hereditary cataracts taken arbitrarily from Nettleship's reports, as follows:

Recorder	Affected	Unaffected
Berry	20	20
Fukala	19	22
Nettleship	29	25+
Zirm	14	15
Nettleship and Ogilvie	17	25
Total	99	107

Dominants.—The following points, quoted from Bateson,[6] differentiate between dominants and recessives. "Dominant characters will, in general, be recognized as such from the fact that they are transmitted through affected persons only. The dominants will, as a rule, have one parent affected with the peculiarity and one part free from it. It is then to be expected that the children of such dominants, resulting from their marriages with unaffected persons, will show equal numbers of affected and normal. Recessive characters will be recognized by the fact that they may appear in the children of parents not exhibiting such characters, and especially among children born of consanguineous marriages. Complete proof of the recessive nature of a characteristic will be obtained only by evidence that all the children of affected parents exhibit the characteristic."

From this we reason that the author's cases conform to the Mendelian law of dominance, because—

(*a*) The transmission is thru affected persons only; there being no case where the inheritance was through an unaffected parent, except in case No. 125, a child whose mother is said to be the only normal of seven children. As this information was obtained from relatives, it is entirely possible that a slight degree of ptosis in her case might be considered normal compared to the marked degree which the other six are reported to have.

(*b*) In every case the dominants (ptosis) have one parent affected and the other parent normal. There is only one case of consanguineous marriage among the cases reported; that being between an unaffected male in the fifth generation (No. 109), wedded to an affected female (No. 43) in the fourth generation; the relationship being that of second cousins, and resulting in one affected and one normal offspring, according to the rule of dominance.

(*c*) The ratio of 64 dominants (ptosis) to 64 recessives (normals) conforms to the third qualification of dominants which requires an expectancy of an approximately equal number of normal and affected children descending from dominants (ptosis).

(*d*) That it is not a recessive character is shown by the fact that in no case was an affected child born from normal parents, one or the other parent invariably showing the character, except in the one case, No. 125, and as this information was gained from relatives, there is a possibility of it not being correct.

(*e*) Thus far there has been no opportunity to determine what would be the result in the offspring where both parents are affected.

Sex-linkage.—Certain ocular diseases of the dominant type follow a sex-limited descent, notably color blindness and night blindness. The distinguished differences in the sex-limited, from the pure dominant types of inheritance, are that in the former—

(*a*) The males are affected more frequently than the females.

(*b*) It may be transmitted by affected males, but never by the unaffected males.

(*c*) It is transmitted by unaffected females.

(*d*) Apparently normal women, daughters and sisters of affected males, transmit the condition to their sons.

In no case in the genealogy save two was an affected child born to a normal parent. These are case No. 1, the first member of the genealogy, an affected female resulting from the union of Martin Maney, an Irish descendant, wedded to Kissia Van, a quarter Indian, both of whom had normal eyes. These cases were not examined, as they lived in the latter part of the eighteenth century, but this information comes from so many reliable sources, and especially from the oldest inhabitants in the neighborhood, that its correctness can scarcely be doubted.

Quoting from a letter from Dr. I. L. English, who was reared in that country, and has been the only physician practising there: "Martin Maney, who came when a boy from Dublin, Ireland, married an Indian. John Metcalf (No. 24) thinks that Martin Maney was little-eyed, but I learn from other old people that he was not; that when his first child (female No. 1) was born, little-eyed, the friends made alarm about the child's deformity, and its father (Martin Maney) told them to not worry, that most all his people in Ireland were little-eyed." This is the first instance of an affected child born of normal parents.

The second case is that of No. 125, sex unknown, said to be affected, born of normal female (No. 90). This family lives in middle Tennessee, and I was unable to verify the statement. It is quite possible that in a family where five of the six children have ptosis, the sixth child might, by contrast, appear normal, when in reality it might have a moderate degree of ptosis. Granting that the information is correct, it would probably mean an instance of recessiveness such as perhaps happened in the case of F 1, the first member of the genealogy. Except in these two cases the inheritance is purely dominant in character.

BIBLIOGRAPHY.

1. Ahlström: Beiträge zur Augenheilk., Heft xvi, 51.
2. Albers and Wrisberg: Dissertation de oculi mutationibus internis.
3. Ammon: Ueber ptosis congenita mit Heredität (R. Hüttemann).
4. Ayres: The Amer. Jour. of Ophth., March, 1896.
5. Bach: Arch. f. Augenheilk, 1895, xxvii, p. 16.
6. Bateson: Mendel's Principles of Heredity, 1913.
7. Paul Bloch: Dissertation, Berlin, 1891.
8. Bradburn: "Ptosis: Its Diagnosis and Value as a Localizing Symptom," Ophthalmology, October, 1906, iii, 15.
9. Daguillon: Bull. clin. nat. opht. de l'hosp. des Quinze-Vingts, v. 117, ref. Jahrb. f. Ophth., 1887, 490 (31).
10. Dieffenbach: Das Schieler und seine Behandlung durch die Operation, Berlin, p. 98, 1842.
11. Dujardin: Journ. scienc. médic., p. 561, 1894, ref. Jahrsb. f. Augenh., 1895, 245.
12. Ginestous, Étienne: "Ptosis bilateral congénita, epicanthus et paralysie des droits ours,"," Gaz. hebd. d. sc. méd. de Bordeaux, 1913, xxxiv, 438-439.
13. Göttingen, 1781.
14. Gourfein: ref. Centralbl. f. Augenheilk., 1896, 629.
15. Guende: Recueil d. Opht., 1895, 345.
16. Heuck: Klin. Monatsbl. f. Augenheilk., xvii, 259.
17. Hirschberg: "Ueber den Zusammenhang zwischen Epicanthus u. Ophthalmoplegie," Neuro. Centralbl., iv, 294.

18. Horles: Reil's Arch. f. Physiol., iv, 213.
19. Horner: "Die Krankheiten des Auges im Kindesalter," Gorhardt's Handbuch der Kinderkrankheiten, 1882.
20. Howe, L.: "Relation of Hereditary Eye Defects to Genetics and Eugenics," Section on Ophthalmology, A.M.A., 1918.
21. Hüttemann: "Über Ptosis congenita mit Heredität," A. von Graefe's Archiv f. Ophthalmologie, 1911-1912, lxxx, 280.
22. Knapp, A.: System of Ophthalmic Practice by Pyle, 461.
23. Koster: "Recherches sur l'état des muscles de la paupière supérieure dans le ptosis congénital," Zeitscher. f. Augenheilk., 1903, iii-iv.
24. Kunn: Beiträge zur Augenheilk., Heft xix, 95.
25. Lawford: Ophth. Review, 1887, p. 363.
26. Leber: Graefe-Saemisch-Hess, second ed., vii, 1076.
27. Manz: Graefe-Saemisch, 1. Aufl., Bd. ii.
28. Mendel: Verh. naturf. Ver. in Brünn, Abhandlungen, iv, 1865; also in English Trans. in Jour. R. Hort. Soc., 1902, xxvi.
29. Möbius: Neurologische Beiträge, Heft iv, 152.
30. Morgagni: De Sedibus et causis morbor, lxvii, ix.
31. Nettleship: "Heredity in the Various Forms of Cataract," Royal Lond. Ophthalmic Hosp. Rep., 1905, xvi, p. 1.
32. Pflüger: Klin. Monatsbl. f. Augenheilk., 1876, xiv, 157.
33. Rampoldi: Annali di Ottalmol., vi, 51.
34. Rossi: Revue méd. franc. et etrang., 1823, 531.
35. Schiler: Correspondenzbl. Württenberg. Aerzte, 1895, No. 4.
36. Seiler: Beobacht. urspürngl. Beldungsfehler u. ganglich Mangels der Augen, Dresden, 1830, 36, 37.
37. Spencer, F. R.: Ophth. Record, 1917, xxvi, 254.
38. Steinheim: "Epicanthus mit Ptosis und Heridität," Zentralbl. f. Ophth., 1898, 329.
39. Steinheim: Klin. Monatsbl. f. Augenheilk., 1877, xv, 99.
40. Stuckey, H. P.: Jour. Heredity, April, 1916.
41. Thompson: Heredity, 272.
42. Tilley: Gaz. hebdom., 1886, No. 1.
43. Vignes: Recueil d. Opht., 1889, 422: Soc. d. Opht. de Paris, 4 Juni.
44. Vossius: Beiträge zur Augenheilk., 1892, v, 1.
45. Wilbrand und Saenger: Die Neurologie des Auges, 1899, 84-86.

THE DEVELOPMENT OF A TONOMETER.

William McLean, M. D.

NEW YORK, N. Y.

This account of work done to place tonometry on a more accurate scientific basis includes some notice of inaccuracies that have heretofore been admitted, and observations regarding the normal intraocular pressure.

The features I set out to improve or eliminate in the Schiötz and Gradle tonometers (and that was all I intended doing), were:

1. To avoid the changing of weights.
2. The elimination of the chart to determine the pressure in mm. Hg.
3. Placing the reading scale nearer to the cornea, so the same person could more easily apply the tonometer and make his reading.
4. Prevention of capillary attraction between plunger and barrel, of fluid from the conjunctival sac.

I made three different tonometers, then tried modifications of them, and finally decided on one which I handed to the Meyrowitz Co. to use as a sample in constructing them on a quantity basis.

I was about three years working on one and another models, trying to overcome the several mechanical difficulties encountered before I was ready for the scale and the determination of the pressure according to the manometer.

It was not until I was ready to work out the scale that I ran against my first real snag. I constructed a testing apparatus using a Riva-Roche manometer, and of course in that type I had to use air as my medium of connection in the tubing connecting the testing apparatus (manometer), and the testing eye.

In order to satisfy myself that everything was O. K. I tried to test it out with a Schiötz tonometer and to my surprise I could not get the tonometer and manometer to agree. I examined my apparatus, but could find nothing wrong, so put on another eye and my readings with that eye were no better than the first. I borrowed a Schiötz; but that gave me no light as to what was wrong. I used a third, with no better results. A Gradle was tried and that would not agree with the manometer. All these tonometers gave lower readings than the pressure as indicated by the manometer, and I could not determine what was wrong.

Thinking that Dr. Gradle must have worked out a testing apparatus I wrote him and received a reply that he had not been able to get a satisfactory testing apparatus; so used as his standard a Schiötz that he know to be correct.

As a could get no help from that direction I went to a professor of physics at Columbia University. He looked over my work and assured me that it was all according to the laws of physics, and if the tonometer and manometer did not agree, it was the tonometer that was at fault.

I then invited Drs. Holzapfel, Hallet, Helfrich, Marple and Schoenberg, at different times, and it was as much of a surprise to them as it had been to me to find that the Schiötz and manometer did not agree. All of these men used the instrument themselves.

Dr. Helfrich hit on the novel idea, which was to try his sense of touch to determine the pressure. I adjusted the pressure to 20 mm. (the mean normal according to Schiötz), and he pronounced it a soft eye. Then without his knowledge of the pressure I increased it until he judged it to be normal according to finger palpation, and at that time the manometer registered 40 mm. (These were enucleated eyes and his fingers were applied directly to the eyeball instead of thru the eyelids as is the custom for finger measurement of intraocular pressure.)

I repeated this stunt with Dr. Marple. He pronounced 20 mm. as a very soft eye and stopped me at 42 mm. as normal. I tried the same thing with Dr. Schoenberg with a similar result, but I failed to make a record of just what he considered normal.

The water manometer was tried and that gave me approximately the same result; and as that is more convenient to manipulate I use it exclusively now.

Dr. Marple had seen Dr. Schiötz testing apparatus, and pronounced it quite similar to mine, altho he complimented me on one or two points which he considered superior to Dr. Schiötz'. He said my method of connecting the tubing to the eyeball was an improvement as I did not have any leakage there, while Dr. Schiötz, he said, was bothered considerably with leakage. Also I had constructed an apparatus which I called a pulsator, which simulated the blood stream pulsations in the eyeball of the living. This apparatus did not alter my readings but rendered them a little more delicate.

None of these men were able to give me any clue as to why the Schiötz and manometer did not agree. I then tried some experimentation on the living animal, a summary of which is given in my article referred to, and which generally showed much higher readings with the manometer than were indicated by the Schiötz tonometer.

I was particularly fortunate just about this time in being allowed to experiment on a person whose eye was to be enucleated on account of glaucoma. I did not think it advisable to alter the intraocular pressure by manipulating the manometer while the interior of the eye was connected to the manometer; but we were able to make some changes in intraocular pressure by manipulating the anesthesia.

After this eye was enucleated I was able to make comparisons and confirm the experiment. The results of this experiment were readings indicating 50 mm. of intraocular pressure by the Schiötz tonometer and 65 mm. Hg. by the manometer.

At this stage of the proceedings Dr. Marple, who had become greatly interested, asked the privilege of sending to Dr. Schiötz one of my tonometers together with a diagram of my testing apparatus and the results of the tests he had seen, and the test on the human eye, as he claimed the distinction of bringing the first Schiötz tonometer into this country.

He wanted Dr. Schiötz' criticism of my apparatus and why we failed to get the same results as Schiötz. I granted this request and it was over five months after Dr. Schiötz received the tonometer and letter that he replied. In his reply he failed to criticize the apparatus and the method of testing, which was the sole object of Dr. Marple's letter. The only remark relative to the testing he made in the letter was "Dr. McLean evidently has values different from mine. I do not understand why."

I constructed the scale from an average of over 100 tests using several tonometers. According to my tests the normal intraocular pressure with the McLean tonometer has for its lower limit 22 mm. and its upper limit not above 40 mm. An upper limit of 40 mm. may be too high for some eyes. I have seen plenty of normal cases registering as high as 40; yet I have found eyes registering not above 36 mm. where there were evidences of glaucoma. On those cases I have tried the Schiötz tonometer also, and have been able to get readings as low as 22 mm. Schiötz.

Since the experiment on the first human case I have had the privilege of two other human cases, the results of which are cited in the article.

According to the literature I could find, Weber and Wahlfors are the only other men making direct manometer experiments on the living human eye in situ. I could not find any record of Weber's conclusions. Wahlfors' test (26 mm.), which he determined to be the normal intraocular tension of that case, is above Schiötz' upper limit, but it is quite within what I have found to be the limits.

At the time I was about to read the paper at the Academy of Medicine, the chairman of the section asked if I would have a physicist go over my apparatus with the purpose of taking part in the discussion. I could not get the Columbia professor because of his absence on Sabbatical leave. I did, however, secure Prof Green of the Boys' High School. He looked over my apparatus, then requested me to demonstrate the apparatus and use both the Schiötz and McLean tonometers. He made notes of his observations and reported the same in the discussion.

Unfortunately they had no stenographer present at that meeting and the report as given in the Archives is only what the secretary had in his notes of the meeting.

FLUCTUATIONS OF REFRACTION IN DEVELOPING CATARACT.

CHARLES ZIMMERMANN, M D., F. A. C. S.

MILWAUKEE, WISCONSIN.

This paper discusses the physiologic and pathologic changes of the crystalline lens in their influence upon refraction, illustrated by a case of developing cataract observed for many years. It was read before the Wisconsin State Medical Society, October 3rd, 1918.

The important part which the crystalline lens normally plays in the refraction of the eye makes it easily conceivable that certain changes of the lens must lead to alterations of refraction. These changes are physiologic and pathologic. The physiologic changes are a natural accompaniment of the growth (with the advancing years in the course of life) of the individual, and are of great interest for the understanding of the pathology of the lens. Most important are the alterations of the dimensions and shape, consistency, and coloration of the lens. During the whole of life new lens fibers are formed from cells at the meridianal rows of the equator of the lens, so that its volume and weight increase, from the twenty-fifth to the sixty-fifth year by one-third, its diameter by one-tenth. (Priestley Smith.[1])

The increase of the volume by this new formation of fibers preponderates over the apparent simultaneous loss of the water content of the lens which produces changes of the nucleus. In consequence of the larger volume of the lens the anterior chamber of older people generally is markedly more shallow. The growth of the lens influences its shape, from the almost spherical form of the lens, if left to itself, of the newborn, to the less curved anterior surface of the senile lens, whose sagittal diameter is smaller than its equatorial diameter. Perhaps the acquired hyperopia at higher age is due to this flattening of the anterior surface of the lens.

Physiologic alterations of consistency are due to sclerosis of the lens, a process which may be compared with the cornification of the epithelium. It is characterized at first by a gradually greater hardness of the more centrally located lens fibers from loss of water. A cross section of the senile lens frequently shows the nucleus dry without luster, the cortex moist and glistening. Hess[2] found in some cases the whole nuclear portion converted into a homogeneous mass, in which no single fibers were visible. The sclerosis increases the refractive index. Halben[3] showed that loss of water alone increases the refractive index of the lens. Whether the higher index in sclerosis is due only to loss of water or also to chemical alterations of the nucleus, e. g., the greater amount of the more refracting cholesterin (Jacobson, Matthiesen), is still uncertain. The nucleus seems to grow with advancing age by supplanting the soft cortex. If this is excessive, it may develop into brunescent cataract, whose brown color differs from the normal senile lens only in degree, not in kind.

Probably in consequence of abnormal loss of water another pathologic condition with apparently normal shape of the lens is created, viz., an abnormally great difference between the central and peripheral parts of the lens which may amount to a difference in refraction of from 10 to 16 diopters. Sometimes the turning of the ophthalmoscopic mirror in such cases shows a migration of the illuminated field in the central parts opposite to that in the peripheral parts. The center of the pupil may appear less bright than the periphery, and the border between them may be indicated by a dark shadow in form of a crescent or a ring. The ophthalmoscopic examination thru the central area of the pupil may reveal more or less high myopia and thru the peripheral area a lower degree of myopia, emmetropia, or hypermetropia. From the similarity of these phenomena with those of true lenticonus, Demicheri[4] termed them spurious lenticonus.

They occur in perfectly clear lenses or in lenses that may remain clear for a long time, but also as precursors of, or in combination with, cataract.

Vision may be considerably reduced, so that extraction is indicated, but in some cases it may be improved by correction of the nuclear myopia. Hess showed that from the 25th year with advancing age the difference between the index of the nucleus and that of the adjoining cortex constantly increases. The refraction of rays at the surface of the nucleus, at equal difference of index, must be the greater the greater the curvature of this surface. As the difference of index at higher age, in which this phenomenon exclusively occurs, is considerable, relatively slight differences in the curvature of the nucleus could essentially influence the refraction. Altho these differences of shape of the surface of the nucleus have so far not been exactly investigated, Hess considers their possibility, a priori, as not too remote to serve in the explanation of the phenomenon.

Another disease of the lens without opacity consists in the formation of radial clefts immediately under the capsule, which may remain transparent for a long time. They may be invisible in certain positions of the ophthalmoscope, but on slightly tilting the mirror may shine with a lustre and again appear as darker streaks. Vision may be more or less impaired, and the patient may complain of polyopia and metamorphopsia due to development of lenticular astigmatism. Gradually the contents of these clefts may become opaque and produce cataract. The affection resembles the first stage of naphthalin poisoning of the rabbit, in which Hess showed that the cataract is preceded by the formation of spokes clear as glass. In this stage, volume and weight of the lens are regularly increased. Becker[5] considered the fine, totally reflecting clefts in the deeper strata of the cortex as the first symptom perceptible during life of incipient senile cataract. Hess, however, proved that these clefts do not lie in the deeper strata of the cortex, but closely under the capsule. He considers this proof important for the understanding of the development of cataract. As is well known, the most frequent form of senile cataract is the subcapsular cortical cataract.

With regard to pathologic alterations of the epithelium Hess examined a large series of eyes affected with various kinds of cataract. The only changes which he could find with certainty in the great majority of these eyes with senile opacities, consisted in more or less numerous irregularly bordered, vesicular vacuoles, of which he could not say whether they lay between epithelium and capsule, or closely under the epithelium, between this and the cortical fibers. He never found them in eyes with perfectly transparent lenses, but especially in comparatively early stages of subcapsular cataract, sometimes scarce, sometimes in such quantities that they gave the appearance of fine vesicular foam immediately under the capsule. He thinks that they cannot be due to anything else but accumulation of small quantities of clear fluid under the capsule, or the epithelium.

Likewise with regard to the occurrence of clear clefts previous to the development of supranuclear cataract, Hess describes a visibly not opaque lens, in which he found a bright reflecting line parallel to the equator between cortex and nucleus, composed of numerous minute clear formations, and also a large number of finest fissures between the apparently normal fibers of the most peripheral layers of the nucleus. It gave the impression as if clear fluid had accumulated in very small quantities in these formations. Hess believes that at the beginning of cataract an intussusception of fluid takes place with the microscopically demonstrated destruction of the epithelial cells, to which he attributes the pathogenesis of subcapsular cataract and the young cortical fibers, which not only anatomically but also in their biologic properties are the more related to the capsular epithelium the younger they are.

To this corresponds the increase of volume of the lens in incipient cataract, evidenced by the greater shallowness of the anterior chamber, as also found experimentally in the first stages of naphthalin cataract. Several cases were attributed to this stage of intumescence of the lens in which, in predisposed eyes, glaucoma was brought on by swelling of the lens. The myopia preceding or accompanying the formation of cataract has been ascribed to these changes. By intussusception of water into the cortex its index will be lowered and thereby the total index increased, and also the curvature of the lens may be increased.

In the progress of cataract to maturity the lens gives out fluid to the surroundings. Its volume and weight decrease and with this the depth of the anterior chamber becomes again normal, with decrease of refraction.

As an illustration of the refractive changes due to pathologic alterations of the lens, I should like to report one of a number of cases which I had under observation for many years:

An otherwise healthy, strong man showed, when first examined at the age of 52, emmetropia, and presbyopia. In his 64th year his sight became impaired. He had developed myopia and incipient cataract, at the peripheral cortex of both eyes. Vision was corrected by R. —3.50, L. —1.00, for reading R. —1.50, L +0.75. At 65, V. R. 20/200, V. L. 20/100. His myopia had increased and was complicated by astigmatism. The ophthalmometer showed R. —1.00 180°, L. —0.75 180°. V. was corrected with R. —5.00 ○ —0.50 cyl. 90° to 20/30, L. —1.00 ○ —2.00 cyl. 90° to 20/20. For reading R. —3.50 ○ —0.50 cyl. 90°, L. —1.00 cyl. 90°.

In certain positions of the opthalmoscope the fundus of each eye was clearly visible, in others not, on account of sclerosis of the nucleus of the lens. The peripheral opaque spokes had not much changed. The anterior chamber was shallow. There was monocular polyopia.

In each of the following years the spheres and cylinders had to be increased, vision gradually decreasing even under correction. At the age of 70 he received the maximum, viz.: R. —10.00 ○ —2.00 cyl. 90°, V. = 20/100, L. —6.00 ○ —4.50 cyl. 90°, V. = 20/50. At 72 V. with these glasses was the same. V. without glasses was fingers at 6 feet.

The ophthalmoscopic examination revealed R. clear red reflex, dimmed in the center by the sclerotic nucleus, details visible, no changes of the retina. Cataract not progressed. Left Eye: The same picture of sclerosis with slight opacities at the equator. Sugar was found in the urine for the first time, but there were no other diabetic symptoms. It certainly had nothing to do with the affection of the lens.

At 75, details of fundus could be seen in left eye, not in the right. The sclerosis of the nucleus had increased. The swelling of the lens had decreased as indicated by the less shallow anterior chamber, and also refraction, which was now: R. —9.00 ○ —1.00 cyl. 90°, V. = 20/100, L. —6.00 ○ —3.75 cyl. 90°, V. = 20/50, i. e., vision had remained the same. It had not changed in the next four years, but myopia and astigmatism at 79 had further decreased to R. —7.00, V. = 20/100, L. —5.00 ○ —2.00 cyl. 90°, V. = 20/50.

At 81 V. with these glasses was, R. 20/200, a little less, V. L. 20/70. The ophthalmoscope showed R. faint red reflex, some opaque cortex on temporal side, clear on nasal side, nucleus opaque. Left: Cortex pretty clear except a few spokes, nucleus diffusely opaque, but details of fundus faintly visible. With R. —2.50 he reads large print; with L. —2.00 cyl. 90°, No. 1 Jaeger at 6 inches, No. 2 at 9 inches, and No. 4 at 11 inches. The patient was a very assiduous reader, and read with these glasses for many hours every day without discomfort.

REFERENCES.

1. Priestley Smith. Pathology and Treatment of Glaucoma, 1891, p. 164.
2. Hess, C. Pathologie des Linsen-Systems.
3. Halben. Graefe's Archiv für Ophthalmologie, vol. 57, p. 277.
4. Demicheri. Annales d'Oculistique, vol. 113.
5. Becker. Zur Anatomie der gesunden und kranken Linse, 1883.

THE NONOPERATIVE TREATMENT OF SENILE CATARACT.

A. S. Green, M. D., and L. D. Green, M. D.

SAN FRANCISCO, CAL.

This paper considers the etiology and forms of partial senile cataract, describes the method of treatment for it, and gives in statistics results obtained.

Senile cataract is a condition which concerns a very large proportion of the human race. While apparently more common among certain peoples than others, none are exempt. It may almost be regarded as an accompaniment of old age just as is gray hair.

One observer has found that opacification of the crystalline lens of greater or lesser degree is present in over 90 per cent of all people past the age of sixty-five. Among white races it occurs frequently as early as forty.

When opacification has begun, its rate of progress is very uncertain. A cataract may become mature in two or three months or it may remain immature for thirty-five years or more. Failing sight of old age, not correctible by glasses, is very often due to this condition. Fortunately this opacification usually takes place at the periphery of the lens, beyond the pupillary area, and thus does not generally interfere with vision. However, the pupillary region is involved with sufficient frequency to reduce the acuteness of vision in many elderly people.

Etiology.—Aside from the cataracts occurring in general diseases as in diabetes, or those following the ingestion of poisons as naphthalin, ergot, etc., and that which is frequent among certain vocations as in glass blowing, we know very little of its etiology. Neither do we know much about its prophylaxis. The question that interests us is: Can the progress of opacification of the crystalline lens be checked or prevented? The attitude of ophthalmologists generally has been that the condition must go on to maturity and the cataract then be removed surgically.

While it is absolutely unnecessary to allow a patient to await the blindness that comes with a mature cataract before resorting to operative intervention, it is also a mistake to operate before the development has reached such a stage as to interfere with business or pleasure. Roughly that stage is reached when vision has fallen to 50 per cent. When it has been reduced to less than 50 per cent there is no need to temporize further, and the cataract should be removed surgically. It is, however, before a loss of 50 per cent has occurred that nonoperative measures should be used to avoid subjecting the patient to an indefinite period of worry and impaired efficiency.

Many remedies have been suggested for the arrest or absorption of cataracts. But it has remained for Col. Henry Smith of Amritsar, India, to put the nonoperative treatment on a more definite basis. By that method in over 80 per cent of our cases, the opacification has been checked or the vision improved. But to obtain these results the treatment must be begun before vision has fallen to half of normal, and carried out in detail. The earlier the treatment is instituted the better the result. The permanency of the treatment is, however, uncertain. With some patients the improvement lasts only a few months, with others the improvement has remained after a period of over four years, the time when we first commenced this treatment. But if this particular treatment does not improve the vision it can do no harm as there is practically no danger from this procedure. We have not had a single deleterious result. Should an operation for cataract be necessary later it is probably an advantage to have had this treatment previously because of the apparent general improvement in eyes following this treatment. The greatest objection that may be raised is the severe pain often produced which may last for several hours.

Type of Cataract and Histologic Changes.—The type of cataract which best responds to this treatment is the simple, uncomplicated senile with radial or diffuse opacification. Dense nuclear or subcapsular cataracts will not be affected materially by this treatment. The pupil should be first dilated in order to exclude retinal changes, especially the senile macular degenerations. These will often account for failure to obtain improvement in vision for which the treatment would otherwise be blamed.

Ophthalmoscopic examination of the lens after treatment will show little apparent change in spite of the improvement in vision as only the finest opacities seem to be affected rather than the larger ones.

Method of Procedure.—The patient should be in a bed in a hospital. Near the bed, within easy reach, should be an electric stove with a basin of hot boric solution for compresses. The eye is anesthetized with three drops of 4 per cent cocain solution instilled at intervals of five minutes. Twenty mm. of 1-4000 cyanide of mercury solution is drawn into a freshly sterilized glass syringe with a small needle. To this 2 mm. of sterile 4 per cent cocain is added. The needle is then inserted under the conjunctiva just below the external rectus and about 1 cm. from the limbus in an area free from blood vessels, and the solution slowly injected. A large bleb of conjunctiva is raised. The hot compresses are applied at once and maintained as long as the patient has pain. It is about the only thing that gives relief. A hypodermic of morphin may be necessary. The eye is compressed three times daily for three or four days afterwards.

The treatment as described above is that as given by Col. Smith. In addition to this the writers have found it of great value to institute auxilliary treatment that is carried out by the patient at home, over a period of from four to six months. One week after the injection the patient is given a 1 per cent solution of K. I. which is to be used as an eye bath in an eye cup for five minutes every morning, and every other night. On the alternate night the patient puts one drop of 2 per cent dionin in the eye. The strength of the dionin is increased 2 per cent each month until an 8 per cent solution is used. This method of using dionin and K. I. has been highly lauded by other writers, and used in connection with the Smith treatment we have found it very satisfactory.

The injection is given only once. Whether repeating the injection would be beneficial we are not prepared to say as we have not tried it.

The results given below were those obtained in private practice, and included 72 eyes.

	Cases	Per cent
Improved	42	58.5
Arrested	18	25
Cataract progressed ...	12	16.5

The degree of improvement in vision ranged from 11 per cent to 150 per cent. In twenty-five cases or 36 per cent of those injected, there was an improvement in vision of 11 to 40 per cent.

In sixteen cases or 22 per cent of those injected there was an improvement in vision of 50 per cent or better.

The period of observation ranged from a few weeks to four and one-half years.

The vision a day or two after injection is usually lower than just prior to injection, but improves very rapidly thereafter and reaches its maximum about one week after. The conjunctiva becomes greatly swollen so that it may protrude between the lids for a few days. The redness persists for three or four weeks. After this the eyes feel "stronger" and the patient reads and sews with much more comfort than before.

Conclusion. From our experience and the observation of others who have given the treatment a thoro trial, this method has been a decided help in conserving vision at a time of life when even a few months or years of sight is worthy of consideration.

NOTES, CASES AND INSTRUMENTS

OPTOTYPE FOR YOUNG CHILDREN.

John N. Evans, M. D.

BROOKLYN, N. Y.

We have all experienced the difficulties arising in taking the vision of young children from the so-called kindergarten test-charts. The very obvious failings of these, suggested this attempt to provide a system which will be at once practical and efficient.

In a review of the literature it was surprising how little careful work had been done along these lines. Such charts as are in common use—those of Reber, Seitz, Ettles, Wolffberg, Thorington, etc., represent fairly well the entire field, the most pronounced faults being in the selection of the characters:

1. Which are made in silhouette, line, shading and combination of these.
2. The names of which may easily be confused.
3. Employing a multiplicity of characters.
4 Which are markedly inaccurate as a measure of visual acuity.
5. Representing objects unfamiliar to the young child.

One factor which seems to have been neglected by many authors is the one of the child's physical condition. The charts are stated to be arranged for children and illiterates but it will be noted that they often present figures far beyond the child's comprehension. Surely we need the help of what little understanding the child has. Illiterates may be either mentally deficient or of normal adult mind, and the chart if constructed to reach the young child, can be followed by them, but not the reverse. With this in mind it seems fair to allow 50 per cent to favor the child's mentality and the other half to gain the visual acuity.

From a study of the statistics we find that the average child in the public schools of Greater New York does not know his letters in a dependable way until he can read, nearly the age of seven and a half, and though he may know his numbers slightly under this age, at six and a half years, he is likely to give unsatisfactory answers at the time of testing. In New York City the child enters kindergarten at the age of five, and elementary school at the age of six, so that these are the ones we need most to reach when the relatively heavy work takes its first toll.

In the construction of characters for a chart certain principles are to be followed:

1. The characters are to conform as nearly as possible to the international standard, particularly in structural and visual value.
2. A circle, or ring is to be used to form the body-structure on which the characters are built.
3. One-minute projections or interruptions of the body are to measure the capacity to perceive and recognize the individual characters.
4. There are to be few characters, as the child's vocabulary and concentrating ability are not to be overtaxed.
5. The characters are to be familiar to a child three or four years old.

In going over many characters used in kindergarten work, and in studying drawings made by small children, particular note was made of those which attracted the young child most and which he reproduced most successfully. After trying many of these it was found impossible to construct test characters from most of them, using a one-minute line and maintaining the five-minute size object. When finished most of them were so out of proportion as to be hard to recognize, or they formed undesirable black masses.

Those finally employed were:

1. *The Circle.* This is simply the body on which the others are built. It subtends an angle of five minutes, the rim is of one-minute width.
2. *The Cat's Head.* The circle forms the body of the character and each ear represents a one-minute mass. The features were made small so that the lower figures would not appear gray at six meters distance.

3. *The Man's Head*, built on the same circle is distinguished from the cat and other characters, merely by recognizing that the projections are at the sides, thus forming a hat-brim. The crown is formed by an arc of short radius. The brim is formed by one-minute masses.

4. *The Apple* is recognized by its stem which projects one minute above the rim of the circle and is the same in width.

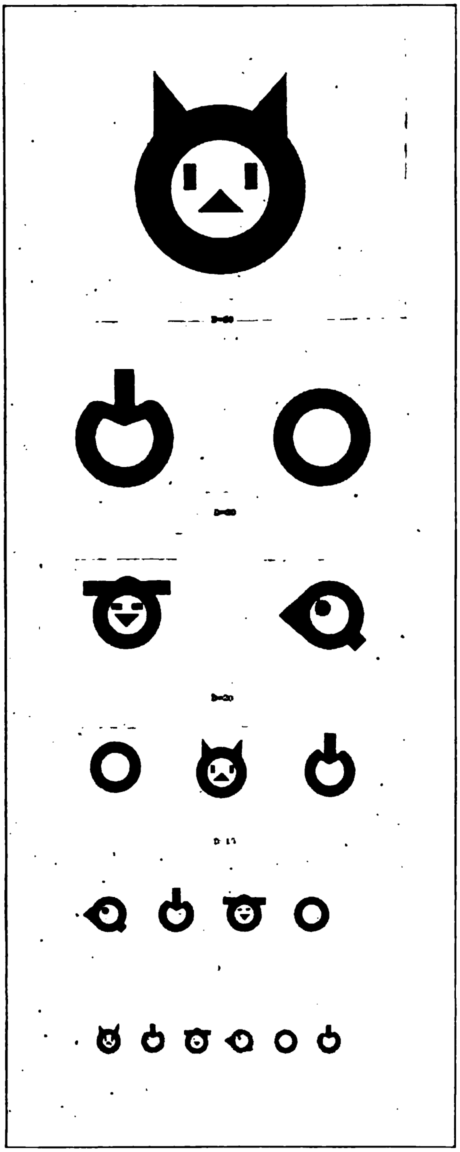


Fig. 1. Optotype for Young Children (Evans).

5. *The Bird's Head* is formed on the circle by adding a one-minute mass for a bill and another for a neck. The latter, as well as the eccentrically placed eye, seem necessary to make the picture complete to the child.

Much develops in the use of the chart which is of interest to the psychologist.

There are many names by which the other characters are called: Cat, fox, tiger, etc., man, monkey, pumpkin, etc., apple, cherry, plum, etc., bird, chicken, bird's eye, etc., circle, hoop, wheel, ring, etc.

Some of the advantages of this test-chart are:

1. The chart has given good results with children as young as three years.
2. It can be used with ease in dispensary and office work.
3. It is not necessary to describe or point to locate the one-minute section, naming the character is proof that it is seen.
4. It requires only simple direct answers.
5. The names of characters are not easily confused with each other.
6. There are many names for each character, allowing the child to answer quickly and not overtaxing its small store of names.
7. The figures are such as have been learned in the child's own experience and represent very familiar objects, as he himself draws them.
8. It is a very satisfactory test for any illiterate.
9. It may be used with mirrors.
10. It supplies a practical "one-minute" test.

INDICATIONS FOR OPERATION IN UNILATERAL CATARACT

Dr. Francisco M. Fernandez.

HAVANA, CUBA.

What should be the attitude of the ophthalmologist towards those frequent cases of unilateral cataract?

This subject has been debated and some authorized opinions have been given in favor and against surgical intervention.

There are really many cases in which the opacity of the lens affects only one eye, while the other eye remains with a degree of vision normal or nearly so, but before giving our opinion about our way of thinking in these cases, we believe that they should be grouped according to their age.

The traumatic or congenital cataracts of children and early youth have often a hard nucleus and although they are rarely unilateral, and most commonly occur in both eyes, one should consider what to do in unilateral cases. In traumatic cases, which are as a rule unilateral, when there is no rapid spontaneous absorption, which so often happens, one should operate, after waiting for some time for the spontaneous absorption to occur[1]. Otherwise, if the cases are left unoperated, in many of them there may occur a strabismus more or less defined, due to the lack of control upon the affected eye and the disturbance of the normal binocular vision. With the operation, strabismus can usually be avoided.

Not all the cataracts of early youth are hard and it could be said that most cases are not, but it is convenient in all cases to operate by any of the different procedures in use. The one we generally follow is that followed by our worthy teacher[2] which consists in the discission or needling operation. We do not make use of the extraction method in order to avoid disagreeable complications, and in children one can practice a series of discissions without any of the dangers that may arise after a simple extraction. This method is also more easy to follow in children.

After the first 20 years of life, these cases vary in the treatment to be followed. Now we do not have to treat with the soft cataracts of children and youth, and the semisolid and hard cases are more frequent. The operative indications are not so imperative as in the previous series, but operation should be done in all traumatic cases, even after waiting some time for the absorption to occur. Even considering the operated eye, nonuseful from the standpoint of vision, on account of the high refraction of. this eye as compared with the normal in the other eye, it is always a source of reserve to be used in a possible loss of the other eye, especially when the patient's occupation is a hazardous one.

The operated eye is really a reserve strength, and could be used only with a strong glass, but as this often produces some mortification to the patient, he ends by not using any correcting glass. This does not mean that the eye is worthless, and although there is no binocular vision, on account of the difference in refraction between the eyes, the operated eye can be used at times.

Concerning the esthetic effect, we agree with Zbikowski[3] that many people consider it a disagreeable thing to have a white pupillary space, as is the appearance in the affected eye, as compared with the normal black appearance of the pupil in the sound eye. This fact may be taken as another indication for operation in young people.

In old people, or people over 40 years old, the chief indication for operation in senile cataract should be the possibility of the other eye becoming affected and that the patient may become blind in both eyes at the same time. Another indication is when an over-ripe cataract may give rise to symptoms as of a foreign body in the eye and afterwards cause a secondary glaucoma.

What we have mentioned is in relation to cases of senile or uncomplicated cataract, but there is another group of cases in which the cataract is not senile, without being traumatic. We refer to some cases of cataract due to local affections like iritis, keratitis, and the like, and those due to some general disease like diabetes. In this group of cases our usual conduct is to refrain from operation in order to avoid unnecessary complications, but there are some cases in which an operation is indicated we do so by means of the combined extraction method.

REFERENCES.

1. Advantages of delayed intervention in congenital or traumatic cataracts, by Dr. Juan Santos Fernandez, Crónica Médico-Quirurgica de la Habana, vol. 35, p. 313. (1909.)
2. How to operate successfully the soft congenital and traumatic cataracts of children and youths, by Dr. Juan Santos Fernandez. Crónica Médico-Quirurgica de la Habana, vol. 44, p. 128. (1918.)
3. Unilateral cataracts, by Dr. E. Zbikowski, España Oftalmólógica, vol. V, p. 1. (1918.)

DIFFERENTIAL MYDRIASIS. ATROPIN, COCAIN AND EUPHTHALMIN.

George C. Albright, M. D.

IOWA CITY, IOWA.

It would seem that so common a subject as mydriasis and the action of the various mydriatics would be unable to furnish anything of interest. However, there has come under my observation a case in which the reaction of the pupils to the different mydriatics was so marked that it led me to an investigation of the literature on this subject. The scarcity of reported cases and the absence of comment on the different mydriatics would lead one to believe that the subject is not so common as at first supposed.

Mydriatics fall into two groups; those which produce mydriasis by paralysis of the myoneural junction of the sphincter pupillae, and those which produce their effect by stimulation of the dilatator fibers. Atropin and euphthalmin are examples of the first group, while cocain represents the second group. Both groups act locally (Roemer[1]). Cushny[2] points out this differential action very clearly.

It is an old saying that atropin paralyses the sphincter, while cocain stimulates the dilatator fibers. According to de Schweinitz[3] the existence of a dilatator muscle in the iris is denied by some authors, but the combined anatomic and physiologic evidence of its presence seems to be conclusive. All agree that there is a definite myotic tract and a definite mydriatic tract. It is also accepted that atropin acts upon the myotic tract, and that cocain acts on the mydriatic tract.

There may be also a marked difference observable in the reaction of the pupil of different individuals at various ages. As a rule (Jackson, personal communication) elderly people respond better to cocain than to atropin. In children the reverse is true. A few cases have been observed in which there is no mydriasis, following the use of atropin in adults.

The case which I wish to report is one in which there was a marked difference in the reaction of the pupil to atropin and to cocain; the former producing only slight mydriasis, the latter producing prompt, full mydriasis. The action of euphthalmin was also tested independently and found to be practically the same as that of atropin. I might note here that all the drugs used were fresh and that their therapeutic action was tested by direct comparison in the eyes of several other patients.

Mr. D., aged 54, laborer, consulted me January 2nd, 1917, for eye trouble which began about three months previous, when he was struck in the right eye by a piece of flying stone. There was some pain, no dimness of vision. The next day the eye felt fairly well. About one month later there began to be dimness of vision which gradually increased until now he sees only large objects. There is no previous trouble in the right eye; left eye, no history of trouble.

Examination showed right vision 6/60, corrected with myopic correction to 6/10; left vision, 6/6. Near vision, right J 12 corrected to J 1 at 22 to 28 cm.; left, J 6 corrected to J 1 at 22 to 48 cm. No muscle error, no ciliary injection, no conjunctival inflammation, no plus tension. Cocain 5 per cent, euphthalmin 5 per cent instilled in each eye. Pupils did not dilate well. Right fundus, fine floating opacities in the vitreous, no cataract, no evidence of glaucoma, no conus. Left fundus, negative. There was a badly deflected septum. Sinus examination was practically negative except for a slight amount of pus in each antrum. A diagnosis of uveitis, right, was made. The patient was put in the hospital on pilocarpin sweats. Locally atropin 1 per cent, dionin 5 per cent, were used; the pupils would not dilate. The atropin was increased gradually, even using powdered atropin, until signs of toxicity developed, the patient growing irrational, but still no dilation. The blood Wassermann was negative, none made on the spinal fluid. There was a marked local and general reaction to 1 mg. of O. T., and to 3 mg. of O. T. The patient observed that his vision was better after each injection of tuberculin The opacities were fewer, apparently. The vision was not tested.

January 8th, 1917, against advice he left the hospital. He came to my office, where the size of the pupils, 4 mm., was noted and cocain 5 per cent, and euphthalmin 5 per cent again instilled. Much to my surprise the pupils dilated to 7 mm. each, and I requested the patient to return to the hospital that the internes might observe the dilatation secured by cocain which we had been unable to secure with atropin.

From January 8th, 1917, to January 30th, 1917, I made numerous attempts to secure mydriasis with atropin and also with cocain. The results obtained were uniform with the first results above noted and were observed by several other physicians. It is worth noting that cocain each time produced good, prompt mydriasis. If instilled when the pupils were under the effect of atropin, mydriasis was secured a little wider than when not under the influence of atropin. When euphthalmin was used alone, mydriasis was secured between 4 and 5 mm.

Summing up my observations of the case; first, there was no mydriasis, either eye, secured by atropin carefully applied, pupils 3 to 4 mm.; second, euphthalmin alone secured some mydriasis, 4 to 5 mm.; third, cocain alone produced prompt mydriasis, 6 to 7 mm.; fourth, cocain, 5 per cent, and euphthalmin, 5 per cent, secured prompt mydriasis; fifth, cocain in the atropinized eye secured widest mydriasis, 7 mm.

Although having no bearing directly upon the subject, the patient's vision when he passed from under observation, January 30th, 1917, was unimproved but was as good as when first seen; 6/12 right, 6/6 left with correction. Repeated efforts to locate him since have failed.

REFERENCES.

1. Text Book of Ophthalmology, 1913, p. 590.
2. Pharmacology and Therapeutic Action of Drugs, p. 310.
3. Diseases of the Eye, 1915, p. 70.

UNILATERAL OPTIC NEURITIS.

Clarence A. Veasey, M. D., F. A. C. S.

SPOKANE, WASHINGTON.

Two isolated cases are recorded below because it is believed there are some points of unusual interest pertaining to each.

Case 1. *Unilateral optic neuritis following the extraction of senile cataract.* D. J. B., aged about sixty, was first seen February 18th, 1913. There was a macula in the center of the left cornea which, according to the patient, had been present since an attack of scarlet fever in childhood. The lens was cataractous and mature. Light perception and light projection were good. In the right eye the lens contained numerous opacities, but the cataract was not yet mature.

Extraction of cataract from the left eye was advised, the probability of the macula interfering to a considerable extent with the central visual acuity subsequently explained, and on July 3rd, 1913, the operation was performed by the combined method without complications. After healing the patient was glassed, obtaining 6/22 vision, but unable to read ordinary type because of the corneal macula.

On March 14, 1914, the cataract in the right eye being mature, it was extracted by the combined method. Patient was quite nervous during the operation and a small amount of vitreous was lost. Convalescence was uneventful, there being no further complications. On April 21st following, the thickened capsule was needled at the hospital. There was no complication and the patient read with glasses Jaeger 2, having 6/12 vision.

On May 14th, about three weeks later, the patient presented himself at the office, stating that he was unable to read the small type any longer. Examination showed a good opening in the capsule, the media clear, but the patient could read only Jaeger 6, and it was impossible to improve the vision beyond this amount. Further examination revealed what was apparently a swelling of the optic disc. Never having had the opportunity to observe a case of optic neuritis in an eye from which the lens had been extracted, it was rather difficult to determine whether the rounded edge of the disc was normal or pathologic. In two weeks more, however, there was absolutely no doubt, distinct optic neuritis being present. Vision which had been 6/12 with glasses was reduced to 6/45, and could not be improved.

Examination of the urine was negative as to albumin and sugar, but the patient was passing a somewhat smaller amount than normal. No blood examination was made. Examination of the nasal accessory sinuses was also negative. As this was before the time we were looking for focal infections, his tonsils and his teeth were not examined.

The fundus of the other eye could be distinctly seen, notwithstanding the macula, and there were no changes either in the media or in the optic nerve.

The patient was given the usual sweating treatment, together with mercury and the iodides, and on November 2nd, 1914, the swelling of the optic nerve had entirely subsided, and with glasses he could read with the right eye Jaeger 3, and his distant vision equalled 6/12.

It must be rather unusual to have an optic neuritis follow the extraction of senile cataract, either as a complication or coincidence, and the case is reported for that reason.

Case 2. *Unilateral optic neuritis following a blow on the frontal region.* Mrs. A. H. M., a married woman, who had enjoyed apparently good health, consulted me September 4th, 1909. She stated that three weeks before she had received a severe blow on the forehead about three inches above the right eye. No disturbance of any kind was observed for two weeks, but about one week before presenting herself for examination she noticed considerable fogginess in the vision of the right eye. Two days before she was first seen only light perception remained. The vision was, for R., L. P., and for L. 5/5.

Examination of R. showed a marked and extensive optic neuritis, the edges of the disc being everywhere blurred, no hemorrhages being present. The media and fundus of the left eye were normal.

The patient's nasal accessory sinuses transilluminated well, there was no free pus in the nares and no indication of any sinus disease. No crepitus could be elicited.

She was given mercurial inunctions and rapidly increasing doses of iodid of sodium. In a few days' time the vision began to improve. On October 16th, 1909, the swelling of the nerve head had so subsided that the nerve was distinctly pale, and injections of strychnia into the temple were employed. On December 3rd, 1909, there was distinct optic nerve atrophy, so far as the pallor of the nerve head was concerned; but the vision for the right eye equalled 5/6+ and remained so until the patient passed from observation which was some months later.

It is believed that in this case the blow on the frontal region, altho a considerable distance above the orbital cavity, produced a periostitis or some other disturbance at the apex of the orbit which in turn gave rise to the optic neuritis. The patient having only light perception at the time of presenting herself for treatment and 5/6+ at the time treatment was discontinued is to be considered exceedingly fortunate.

SOCIETY PROCEEDINGS

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

Annual Congress held in London, May 1st, 2nd and 3rd.

President, Mr. J. B. Story, Dublin.

The President expressed his high appreciation of the honor conferred upon him by his colleagues, in electing him to fill the chair of the Congress. The Society, he said, was much indebted to its past Presidents, and to none more than Mr. Treacher Collins, who steered the bark of their fortunes through the stormy weather of the last years of war. It was largely due to him that the last Congress was such a success.

On that occasion the discussion on plastic surgery of the eyelids excited very great interest, and the exhibition of cases, photographs and casts made a deep impression on those privileged to attend the meeting, or who visited the Plastic Hospital at Sidcup. The same subject had been chosen by the Bowman Lecturer this year, Professor Morax. The discussion also on Contagious Diseases of the Conjunctiva, held at Swanley, was also a pleasant and important feature of last year's Congress.

He also expressed satisfaction that the Oxford Ophthalmological Society and the Midland Ophthalmological Society had become affiliated with the larger body. He was now happy to state that three other societies had also been affiliated: the North of England, the Egyptian, and the Irish.

Among the deaths during the past year, he wished to specially mention four, two of them Original Members—Dr. John Couper and Dr. Thomas Buzzard, Mr. Devereux Marshall had died in Bombay on active service, of cholera. He believed Mr. Marshall was at one time Secretary of the Society, and he had served on its Council. Another whose name he would mention was Sir James Mackenzie Davidson, whose work on the localisation of foreign bodies in the eye by means of X-rays was familiar to all. He concluded by a reference to the special subjects for discussion at the present Congress.

On the initiative of Sir Anderson Critchett, the President was cordially thanked for his address.

Abiotrophy of Retinal Neuro-Epithelium.

Mr. Treacher Collins read a paper on Abiotrophy of the Retinal Neuroepithelium, or "*Retinitis Pigmentosa.*" He pointed out that the pathologic examination of several eyes with retinitis pigmentosa had shown that the affection might occur without sclerosis of the choroidal blood vessels, and that the primary change appeared to be a degeneration of the rods and cones. As the condition is hereditary, he suggested that the degeneration might most aptly be described as an abiotrophy. From this standpoint, its various accompaniments might be explained as follows:

The increase in the neuroglia of the retina is similar to that met with in various forms of neuronic abiotrophy, and not like what occurs in sclerosis where there is an increased firmness in consistency. Secondly, the pigmentation of the retina is caused by the degeneration of the rods and cones, together with their attached nuclei, leaving spaces in the membrana limitans externa, through which the pigment epithelial cells, or their pigment granules, can migrate. Such migration he considered was probably due to the physiologic capacity for movement in the direction of light, which these cells and granules possess.

The light-coloured dots sometimes seen in the retina, and the hyaline nodules occasionally met with on the optic disc, are of the same nature; and are due to hyalin degeneration of cells derived from the outer layer of the secondary optic vesicle, from the pigment epithelium overlying the choroid, and the neuroglia in the optic papilla. In typical cases the degeneration of the neuroepithelium commences where it is first fully developed. Around the macula, which, being last developed, is last involved. This is why sight begins to fail in the form of a ring scotoma.

Night blindness, the earliest symptom, is due to the failure of vision commencing in the part of the retina which, in the dark-adapted eye, is the most sensitive to light, that is 10° to 20° from the fovea. Typical cases of retinitis pigmentosa occur in which the macula alone is involved. There being no blood vessels at the macula, there are, in these cases, no branching pigment patches, only scattered dots and granules of pigment. The deafness and affections of the nervous system met with in association with retinitis pigmentosa are also due to abiotrophy.

DISCUSSION: Professor Herbert Parsons remarked on the danger of labeling a diseased condition with a particular term, and considering that this explained it. Even if it were an abiotrophy, one had to get behind that and try to ascertain the causation. He did not think it would be difficult to oppose arguments to each thesis set up by the author, if there were time.

Sir Anderson Critchett spoke of the way subjects of retinitis pigmentosa were helped by wearing yellow glasses. He asked whether members had had experience with Crookes glasses (which take out the purple rays) for this condition. The subject was also discussed by Mr. R. Greeves and Mr. M. S. Mayou.

Sclerectomy for Glaucoma.

MR. GEORGE YOUNG read a paper on results of double sclerectomy operation for glaucoma. The paper was founded on 12 cases. The reduction in tension had been, so far, permanent: there had been no bad results over periods of several months to two years. The incision must be as near the limbus as possible, and he emphasized the necessity of making a second opening. The operation which he described could now be done on cases of acute glaucoma. It was not disfiguring and there were no relapses. The President considered the operation easy compared with other procedures.

Glaucoma Operations.

LIEUT.-COL. HERBERT contributed a paper on the future glaucoma operation. He said that in India cases of glaucoma were always far advanced when seen, and he had been driven back to the iris prolapse operation. An incision was made by puncture and counter-puncture, with a 1 mm. Graefe knife: the incision was entirely subconjunctival. In advanced glaucoma the incision could be safely made of almost any size. This operation was free from the disasters which might attend iridectomy for the condition. The whole operation could be performed without emptying the anterior chamber, and its chief feature was the sufficient widening of the filtration area. He described the technic in minute detail.

Contracted Sockets.

MR. R. R. CRUISE read a paper on contracted sockets in which he described a procedure to enable a socket which had been disorganized by injury to hold a glass eye.

DISCUSSION: Mr. C. Higgens showed a number of soldiers on whom he had performed various operations for the same purpose, and demonstrated the procedure followed in each case.

Mr. W. Sinclair discussed Eye Complications in Cerebro-spinal Meningitis, and Mr. Percival J. Hay read a paper describing some new test-types.

VISUAL REQUIREMENTS OF AVIATORS.

On Thursday afternoon members assembled at the Psychological Laboratory, University College, where a discussion was held on the subject of Visual Requirements of Aviators.

Stereoscopic Vision.

PROFESSOR SPEARMAN delivered an address on stereoscopic vision, which had been decided by many people, including Americans, to be the most important factor in the visual fitness of aviators, especially in regard to successful landings, a source of much mortality among fliers. He divided his remarks into (1) a method of testing stereoscopic vision in candidates, (2) suggestions as to means of improving the vision of aviators.

This faculty had to be differentiated from quasistereopsis or the power of appreciating depth, which depended on the clues at the disposal of either eye alone. In stereoscopic vision, each eye had to form a good image, and that depended, principally, on the optical excellence of the iris. It seemed to be considered that for binocular vision all that was required was for both eyes to function, instead of only one. But there was only one visual field in consciousness, tho there were two ocular fields; and both ocular and conscious fields could not function with regard to the same spot at the same time. It was seldom that both eyes acted simultaneously: that was sometimes due to asymmetric astigmatism. It was important to try to find out how the ocular movements tested the balance of muscles. The eyes took up the right position for clear seeing if given plenty of time, but it did not necessarily follow they would do so when speed was essential. A test embracing the following of a moving field was therefore necessary.

Results of Ocular Examinations.

Mr. A. R. Brailey tabulated his results in the ocular examination of about four thousand candidates for the air service. The visual standard was, at first, very high, but later it was somewhat relaxed, and the fitting of lenses to the flying masks was permitted, and they proved quite satisfactory. Some officers asked for a difference in the shape, and others requested tinted glasses on account of glare. The lowest vision permitted was 6/18 with the better eye, 6/24 with the worse, corrected by glasses to 6/6 and 6/9 respectively. Binocular vision and a good sense of perspective were not always found to go together.

No rejections were made on account of faults of muscle balance, apart from actual squint. Flying failures were not found to be more numerous among the wearers of glasses than among others. Perception of the parallactic movement of objects he regarded as the all-important factor, but this he had found it difficult to assess by any test. When making a landing at a high speed, it was difficult to see the details of objects, and in that operation he did not think stereoscopic vision could be of great assistance. Little could be done in the way of correction of muscle defects by any form of training, however continuously carried out. Before candidates were accepted, details of their heterophoria should be available, both before and after treatment. For this service, a more important matter than acuity of vision in itself was the precision and rapidity of coordination between eye and brain: it was useless for a man to see perfectly unless he could accurately interpret, and act quickly in accordance with his perception. Flyers could not be selected by medical examination alone, any more than an efficient cricket team could be so selected from among the boys in a school: in flying, pluck, resource and response to stimuli were more important than medical perfection, especially in war time. Still, medical examination was important in regard to stress and fatigue, especially at high altitudes. Standards of light and color sensibility should be set up, so that parents could know, years beforehand, whether their sons were likely to attain to them. One very successful flying man in the service had 5 D. of myopia in each eye, and (probably as a result of wearing glasses) he had but indifferent binocular vision. A too stringent standard would exclude many otherwise desirable men.

Discussion: Major Clements said 26% of the men who came under his observation had glasses ordered, and they were turned down on account of bad landings. He described in detail the tests he employed and the results obtained. Of 294 men, 60% who were rejected on account of having made bad landings had been in clerical or other close occupations. He had much of interest to say as to actual flying. The way in which the aviator knew whether he was flying level demonstrated the importance of good peripheral perception. The good flier looked at his horizon and used the nose of the machine as a protractor for measuring the flying angle.

Professor J. H. Parsons spoke of the need of research in this matter, of which the work done by Professor Spearman was a good example. This was the more needed on account of the already large amount of literature on the subject, too large a proportion of which was merely speculative. One of these important questions was that of heterophoria, and researches on the subjects coming within the scope of the present discussion should be against controls, as was the case in any well-conducted scientific inquiry.

Mr. Ernest Clarke spoke of the importance of testing under homatropin in every case, in order to exclude latent hypermetropia. Nearly all the men he had examined because they had crashed had hyperopic astigmatism, but they had been passed as what was termed "practically normal."

Col. Flack referred to the large range of capacity in candidates for the Service, and said that two very important questions had to be asked in this connection: (1) Was he likely to acquire the art of flying? (2) Was he likely to be able to stand the wear and tear of flying? He emphasized the point that a man with good arm and leg movement and coördination might fly successfully, even tho he might not have perfect vision. In regard to the second point, if a man's vision could be easily deteriorated by fatigue, that was a man one had to watch. But men's eyes could be greatly improved by rest and training. He thought a military pilot should have visual tests at varying altitudes for a period of at least one hour: An ophthalmic specialist should be there to test the vision. Even then much would remain to be settled. He thanked Professor Parsons for his suggestion as to research on this subject.

THE BOWMAN LECTURE.

Plastic Operations on the Orbital Region.

Professor Morax delivered the Bowman Lecture, taking as his subject "Plastic Operations on the Orbital Region, Including Reflection of the Orbital Cavity, Eyebrows and Eyelids." The author opened with a felicitous acknowledgment in the name of France of the high honor conferred on him, and thru him, on French ophthalmology, by asking him to deliver this lecture.

He said the prime motive for wishing to restore the appearance of the face when functional disability was not present was the avoidance of the unsettling curiosity manifested by the people met in the street, with which must be coupled the fear that his obvious defect would cause a lessening of affection on the part of those he held in esteem.

There should be avoidance of the use of tissues in the formation of a flap in the regions of motor nerves, and the utmost degree of asepsis must be insisted on. He found the skin surface was sufficiently sterilized by sterilized soap and tincture of iodin; any organisms remaining on them were generally saprophytic. Hairy flaps sometimes harbored saprophytic organisms, and these might afterwards cause little foci of suppurative folliculitis. It was necessary to devise a method of securing more perfect sterilization of hairy flaps.

When the conjunctival mucous membrane was alone at stake, one usually succeeded with physiologic salt solutions, with instillations of zinc sulphat or silver nitrat. It was easier for the lacrimal mucous membrane to be a source of infection. Some failures in this region had been due to operations having been done when there was latent dacryostitis, and in such cases the extirpation of the lacrimal sac and its diverticula would alone be efficacious, the lacrimal canaliculi being excised.

With regard to repairs of injuries to the *brows*, by burning or the explosion of powder, when only one brow has been involved, it was easy to detach its breadth, leaving a nasal pedicle, then fixing the isolated flap in an incision made symmetrically on a level with the upper margin of the orbit. When both eyebrows are destroyed, there must be recourse to nonpedicled hairy flaps, and these were less certain in results. He used for these cases flaps from the occipital region, fixing them in position by several mattress sutures. One disadvantage was that the hair on the new flap grew rapidly, and one of his cases had to have his eyebrows cut when he went to the barber.

With regard to repairs to the *eyelids*, an extensive cutaneous destruction on a level with the lids was followed by an obvious modification of the palpebral fissure, and the mutilation would be even greater when it involved skin and subjacent tissues, muscle, etc. The first act in such cases must be to bring together the margins of the two lids, after having freshened the mucous margins in the usual way. In most cases, the union of the lids must be maintained for two or three months. Professor Morax entered into the technic in detail.

He proceeded to speak of repairs to the *orbital cavity*. When the wound received involved total or partial destruction of the eyeball and its mucous membrane, there was a shrinking scar of the orbit, and more or less complete adherence of the lid tissue to the orbital tissue, and these symblephara prevented the wearing of an artificial eye. Sometimes enucleation had been done by a surgeon who did not appreciate the importance of conserving every bit of mucous membrane. One must wait until the process of scar formation had been consolidated and there were no more signs of infection, before attempting to graft. Whenever possible, one had recourse to cutaneous pedicle flaps taken from the neighborhood. He described various types of cases, and the procedures adopted.

With regard to complete *symblepharon*, if all the mucous membrane were destroyed, the method described would have to be modified. He had found it best to openly expose the parts to be grafted, and keep them open until the graft was in good condition. In some cases it might be necessary to combine the dermo-epidermic grafting method with the pedicled flap one in total symblepharon. Professor Morax concluded by describing his methods of securing a mobile support for an artificial eye.

Eyesight and Education.

On Friday morning, at the Royal Society of Medicine, an interesting discussion took place on the subject of "Eyesight in Connection with Education."

DR. JAMES KERR said that at the present time any examination of the relations between vision and education rested much on the testing for acuity at school, while such matters as fatigue, functional troubles, the ocular results of various kinds of work, and the risks of visual deterioration were scarcely noted by those having the oversight of education. The use of the Ives' grating and testing each eye separately did not yield fair results; the second-tested eye usually gave the worst record, and he now abandoned the method. He much preferred the copying of test types by children using both eyes, as this gave practically all the results required, and there was no waste of time. These results also provided a good basis for mass investigations.

The tables in the earlier Board of Education Reports showed a great variation according to the districts concerned: e. g., 19.5 per cent with bad vision in Newcastle to 4.4 per cent at Ashton-under-Lyne; 11.3 per cent Lancashire, 4.8 per cent Gloucestershire. By careful testing of very young children with test types, Dr. Margaret Hogarth got 86 per cent normal vision in 800 infants, and only 3.2 per cent cases of bad vision. She took every precaution to keep the attention fixed, and introduced a number of requirements.

The local variations involved national problems, and were due, no doubt, largely to preventable causes, but there had not been any investigation on the question. He considered they were closely related to the general surroundings and were closely connected with the general health. The results in eye testing were largely influenced by the condition of the general cerebral cortex. Fatigue was important in academic work, and ocular fatigue, tho masked by great accommodative range in the young, was a contributor to nerve fatigue.

With regard to myopia, four-fifths of the children passed through all the strains and troubles of school life ocularly unharmed, but the majority who suffered from it became myopic. The increase of myopia year by year of age was not correlated to education, but to age. In a large number of cases Inglis Pollock showed that up to the 14th year 7 per cent to 8 per cent were myopic, but after that age it jumped to 15 per cent to 19 per cent, and remained above that figure. About puberty there was a real increase in the myopia present, also during the convalescence following acute illness.

Sweden, by adopting classical education and Gothic print, had greatly increased the proportion of good vision in the country. He proceeded to emphasize the great importance in this connection of general nutrition. There should be careful measures to avoid glare and strong light contrasts, and children should be spared all unnecessary fatigue. He indicated the lines along which he thought further investigation should be carried.

Discussion—Mr. N. Bishop Harman dealt with the clinical aspect of the subject, and he left out of account children who had attained to some stability of tissue and whose vision was good according to accepted standards. The remainder of the school population included (1) the immature, (2) the defective, (3) the blind.

With regard to class (1) the instability of accommodation and of binocular vision in early years was notorious, and this instability must extend to other functions. Owing to the intimate relation of brain and eye, the effect of any form of close work on the child was serious. To the child, even the recognition of figures and letters was a mental feat, and he believed the eyes felt fatigued according to the degree of mental exertion. Adults had only to remember the ease with which they could skim over a novel for hours, yet felt fatigued by a comparatively short study of a scientific treatise. Yet the daily routine of the school child was comparable to the latter.

When one read of the average work required of the average infant, one was led to inquire what was the average infant, but there was, as yet, no answer. No steps were taken to ascertain what the eyes of any particular infant were like, nor whether its defects would render the child incapable of bearing up against the strain put upon them. Between the fourth and seventh years the infant went thru a training at school without any medical eyesight examination. The refraction could always be measured. He had examined the refraction of all the infants in a high-grade school in the West of London. The eyes of each child were anointed with a fresh preparation of homatropin and cocain in castor oil (2% of each), then the child was allowed to sleep for an hour. After the examination the eyes were anointed with a minute smear of 1 per cent eserin in oil, to effect closure of the pupils as quickly as possible.

In this way 368 children, of ages 4 to 7, were examined. Only 8 wore glasses. Only 8 had emmetropic eyes, but there were 232 hyperopes, viz.: 130 under 1 D., 73 under 2 D., while those with not more than 3 D. were 29. There were 38 who had more than 2 D. astigmatism. Only very few had myopia of any degree, tho one child had 18 D., 7 had scarred eyes, 23 had anisometropia of over 1 D., while 8 had squint.

The summary of his conclusions was that one in every three was not fit to do ordinary school work under ordinary conditions, results which were striking and unexpected. He strongly condemned the practice of submitting young infants to school work without a preliminary examination of their eyes. There should be a definite grading of the little ones at these early ages. Indeed, the subject was sufficiently serious to warrant its examination by a committee of this society. He concluded by a description of special methods, such as those seen by members at their visit that day to the schools at Camden Town and Hempstead Road.

The subject was discussed by Mr. Harrison Butler, Mr. Ernest Clarke, Mr. Percival Hay, Mr. A. L. Whitehead, Mr. Inglis Pollock, Mr. Evans, Mr. C. W. Thompson, and the openers replied.

On Friday evening a series of papers were read and discussed.

Angioma of the Choroid.

Mr. Treacher Collins and Mr. Leslie Paton reported a case. The patient, a boy, first came under Mr. Paton's care in 1917, when he was 14 years of age. There was a large nevus on the left cheek and outer side of left orbit. There was detachment of retina outwards and downwards. The tension of the eye was then normal. Puncture of the sclera was made with the galvanocautery, but the vision did not improve. A year later, an acute attack of glaucoma occurred, and the eye was removed. There was found to be a lens-shaped mass in the choroid, measuring 9 mm. in length, 5 mm in breadth, extending from the upper margin of the optic disc to a little behind the equator. There were the typical appearances of cavernous angioma. In the partitions between the vascular spaces on its inner surface were well developed lamellae of bone.

Presbyopia.

Mr. Ernest Clarke read a paper on presbyopia, a subject which, in the author's opinion, had been very inefficiently treated in the past in the various text books. Presbyopia synchronised with important body changes. The "squeezability" of the lens decreased with age; and in the normal emmetrope, at 48 years of age, it had decreased to such an extent that the person was conscious of requiring aid for near work. This was not a disease, but a physiologic change, which affected all eyes alike. He considered that true presbyopia was entirely dependent on the lens, not due to any weakness of ciliary muscle, except in advanced age.

Presbyopia was felt most at the time when eye strain was most liable to occur, and Leonard Williams and others had shown the dangers of hyperthyroidism, especially in connection with intestinal poisoning, for when the thyroid gland was deficient, the gate was opened for the poisoning of the system by toxins. He advocated the wearing of bifocal glasses. A mistake commonly made in these was to give a too strong reading addition to them.

Evulsion of the Optic Nerve.

Col. Lister and Capt. M. L. Hine contributed a paper on the condition of evulsion of the optic nerve. The authors had been able to find records of only 22 cases, and only 4 with a pathologic report, yet during the war this condition of the optic disc had become familiar. It was recognized either by a hole at the optic disc, which might occupy the whole or a part of the scleral ring, or the disc might be filled apparently with white. In both cases the retinal vessels had either completely or partially disappeared. The tearing of the tissue resulted in gross hemorrhage at the back of the eye, so as to obscure the field for the ophthalmoscopic examination. When, as occasionally happened, little or no hemorrhage took place into the vitreous, the ophthalmoscopic picture was one of the most striking possible: a fundus oculi without vessels, an optic disc replaced by an apparently bottomless glaucomatous pit set in a background in which there were dramatic concussion changes. The paper gave a minute description of the changes found, and was supplemented by a number of colored pictures, shown by means of the epidiascope.

Bilateral Choroidoretinitis.

Mr. E. Henderson read brief notes on a rare form of bilateral choroidoretinitis in a young child. The child, aged 6 years, was brought on account of occasional convergent strabismus of the left eye. After wearing correcting glasses and having the defective eye trained, the strabismus disappeared.

Two and a half years later, the sight having deteriorated, there was found in the right eye a brilliant white exudation to the macular side of the disc, in the center of which was a circular, partly pigmented patch. Some months later the left eye suddenly failed. A similar symmetric patch was found in the fundus, but accompanied by widespread exudation, and surrounded by some hemorrhage.

No source of infection could be found, and the Wassermann and tuberculin tests were negative. The scattered exudation gradually disappeared, and the appearance at present closely resembled that of the fundus of the other eye. He regarded the condition as due to some unexplained choroidal vascular lesion.

The following papers were also read:

Mr. Arnold Lawson: A New Method of Applying *Radium in Diseases of the Eye*, who described the rationale in collaboration with Mr. Sidney Russ. (2) Flavine in Ophthalmic Surgery.

Saturday morning was devoted to a *clinical meeting* at the Central London Ophthalmic Hospital, when many cases of interest were exhibited and discussed.

During the Congress, members visited the Day School for the Blind, Brecknock Road, Camden Town, the Myopia School, Exmouth; Street, N. W., and the Wellcome Museum, Wigmore Street. A dinner was held at the Welbeck Palace Hotel, and a museum of exhibits and specimens was established, under the care of R. R. James. On Saturday afternoon many members gladly participated in a golf match at Northwood.

ROYAL SOCIETY OF MEDICINE.

Sections of Ophthalmology and Laryngology.

These Sections held a combined meeting on Wednesday, April 2, Mr. W. T. Holmes Spicer occupying the chair. The subject of discussion was:

Injuries and Inflammatory Diseases Affecting the Orbit and Accessory Sinuses.

The Chairman expressed the hope that great good would come from the present meeting, which arose from the desire of ophthalmic surgeons to know a great deal more about the dangers which beset the precious optic nerve in its course from the eye to the brain. He remembered the time when there was but little expert knowledge concerning the ethmoid and frontal sinuses and when the departments of ophthalmology and laryngology at large hospitals were in charge of physicians, and the outlook upon them was purely medical. It was very important that the ophthalmologist should know when to call in an expert to deal with defective sinuses.

Mr. L. V. Cargill opened the discussion. It was, he said, surprising to find that cases of optic complications from sinus trouble were so few, because of the thinness of the partition dividing sinus from orbit. Ophthalmic complications might present themselves as functional disturbances, or as toxic effects. There might be contraction of the peripheral field, central scotoma, papilledema, papillitis, uveitis, episcleritis, subretinal effusion, retinal detachments, and so on. Nasal sinuitis was a chief cause of orbital inflammation. There was a small group of cases comprising retrobulbar conditions, and a larger one consisting of subperiosteal inflammations caused by extension from the nasal sinus. In ethmoidal cases, an acute specific fever seemed to be the usual primary cause. In young children, acute cases often responded to fomentation and good nursing. He asked whether the staff of ophthalmic hospitals should not include a rhinologist. If, in suspected sinuitis, expectant treatment was not succeeding, an exploratory incision should be made without delay. In this war, the proportion of injuries inflicted by shell fire compared with those by rifle bullets was higher than in the South African war, and the sinuses had suffered in a correspondingly greater degree. Practically every case in which the wound was purely orbital had made a good recovery. The general results had been definitely aided by antitetanic serum, stereoscopic radiography, the telephone probe, and the electromagnet. No attempt had been made to remove deeply situated foreign bodies unless they were causing definite trouble. The essence of sinus treatment was efficient drainage and irrigation. He described and illustrated a variety of cases.

Mr. G. Seccombe Hett remarked on the benefit of such coöperation among experts, not only in regard to the more efficient treatment of war injuries, but also cases of injury met with in industrial practice and in disease. His experience during the last three years had been with cases from the war after their arrival in England. The best results followed free drainage and as little movement of bony and soft tissues as possible. Mucous membrane was stitched to skin, and was not taken away. In a number of cases he had been able to reconstitute an eye socket because the conjunctival mucous membrane had been retained. He showed an instructive selection of slides illustrating treatment in a variety of conditions.

Mr. A. W. Ormond based his contribution on the cases which had come under his care at the Second London General Hospital during the last four years, and in particular on 100 cases. He could not say that serious damage to orbit or sinuses had resulted in any subtle change in vision; the results were those of the original injury, or of inflammatory change set up by it. In some patients there was optic neuritis in the uninjured eye. Pain arising in consequence of inflammation of the sinuses was sometimes referred by the patient to his eye. In two cases, blind eyes had been removed on account of severe pain supposed to originate in them, but it was found to have arisen in the nasal condition. Sometimes a deep wound was found to have affected four sinuses.

Mr. E. D. D. Davis spoke of his experiences in this connection at casualty clearing stations. He had been struck with the frequent occurrence of a fissure-fracture of the roof of the orbit when making postmortem examinations in cases of bullet wounds of any part of the skull. Fracture of the anterior fossa was accompanied by diffuse intradural hemorrhage, and these cases usually succumbed in twenty-four hours. Even if this period was survived, death took place in from three to six days, from basal meningitis, due to infection of the wound cavity. In cases of sinus injury, he regarded early suture as very important. He asked for opinions as to the wisdom of draining severe orbital cellulitis through the nose. Suppuration of the antrum, of nasal origin, was nearly always accompanied by suppuration of other sinuses also, but in cases where the suppuration in the antrum was due to the condition of the teeth, the antrum remained the only cavity involved, and in such cases no retrobulbar neuritis had been recorded.

Mr. H. D. Gillies expressed his objection to the early suture advocated by Mr. E. D. Davis. In the honeycomb presented by the sinuses one could not excise the whole wound, and early suture meant giving a good deal of trouble in the later stages of (restorative) treatment. Excision of the wound in a fleshy part was quite justifiable, but it was not possible in the sinus region. In the next Bolshevik war the best practice would be found to be to keep entrance and exit wounds open as much as possible, so as to permit of efficient drainage until no question of suppuration remained. Very great benefit had resulted in the treatment of war injuries by the coöperation of the dental and the plastic surgeon, and he hoped much from the combination of the efforts of rhinologists and ophthalmic surgeons, of which this meeting was an earnest.

Mr. D. Leighton Davies spoke of the effects of nasal sinus affections on the fields of vision and on the ocular muscles. Some cases of heterophoria were secondary to sinus affections. The fields should always be studied, because patients did not make voluntary complaint in this respect. He had never met with a case of chronic nasal suppuration which did not show some changes in the visual fields. There might be scotoma, or an enlargement of the blind spot. When sinus disease had been operated upon, the blind spot enlargement subsided, only to again enlarge if the nasal trouble returned. Even when the field of vision was reduced to 10°, he did not find the patients complained of difficulty in orientation. If the sinus trouble had been long-lasting, its cure did not always result in complete restoration of visual fields. In discussing the etiology, he said no one theory yet advanced would account for all the cases. The discharge from the involved sinuses, being swallowed, set up a toxemia, which so spread to the eye. If that were true, one might expect to find contraction of visual fields in association with suppuration in other parts of the body, but he had not yet found that in sufficient numbers to warrant the drawing of conclusions. He had, however, found contraction of fields in cases of chronic suppurative osteomyelitis, chronic otorrhea, and leucorrhea with endometritis.

The debate on this subject was resumed on April 10, the chair being occupied by Dr. James Donelan, the President of the Section of Laryngology.

Mr. W. M. Mollison, in reopening, said most of the cases of the kind under discussion which he had seen were those which had been under the care of Mr. Ormond on account of damage to the eyes, and he did not see them until some months after the receipt of the injury. He had been impressed with the amount of time and trouble and suffering on the part of the patients which might have been saved if an ophthalmologist and a rhinologist had attended the cases from the commencement. This was especially so in the cases in which drainage into the nose might have been effected before any attempt was made to repair lids or sockets. When the latter had been done there was often a persistent pus discharge. He divided the cases he had seen into clean thru-and-thru bullet wounds, and secondly all other kinds. The usual result in the former was adhesion between outer wall and septum. Infection of sinuses was generally a sequel of the obstruction. All the cases he saw—at St. Dunstan's—were blind, some completely so. In one case, in restoring the nasal airway, he opened an adhesion between the septum and ethmoid, and infection of the meninges took place. The result appeared to be very good, but three weeks afterwards the officer developed meningitis and he died in three days. In some there was parosmia, due to damage of the olfactory nerve. Among the men at St. Dunstan's he found the sinus most frequently affected was the frontal; the proportion was 13 frontal, 2 antral. In some cases the deep wall of the sinus had been fractured and dura mater exposed. One man was wounded by a shell in May, 1917; shrapnel entered the right side by the canthus, and he had a sinus round the right inner angle of the orbit. At the operation a very extensive ethmoiditis was found, and there was a large piece of khaki clothing in the ethmoid, which had been there seven months. He had not yet discovered a case of sinus suppuration in connection with retrobulbar neuritis, tho he explored in a routine way with a Killian's speculum. He had seen only one case of orbital cellulitis which could be called idiopathic. It was that of a girl who was admitted into Guy's Hospital desperately ill. He could find nothing wrong with the sinuses. She died in two days of most extensive pyemia, and no primary source could be discovered. In 99 per cent of these cases he thought the sinus at fault was the frontal.

Mr. J. F. O'Malley said he had notes of about 60 cases of trouble in nasal and accessory sinuses in which there were also eye lesions and injuries of the lacrimal apparatus. In the case of wounds of the ethmoid he had found that where there was previous obstruction sepsis was invariably present, and free incision and thoro drainage was needed. But he had been struck by the fact that in a large percentage of his ethmoidal cases there was so little spesis that extensive treatment was not called for beyond the removal of adhesions. In the case of gunshot wounds, there was great facility in healing once a good airway had been reestablished; this in contrast with ordinary ethmoid involvement secondary to nasal inflammation. Much the same could be said of antral lesions. Out of 50 thru-and-thru wounds of the antra he had only to operate on 11 for sepsis; in 11 others he operated for the removal of foreign bodies. He had 18 cases of eye involvement; in 10 the eye was lost, in 8 there were injuries to it of varying degree. Where the injury to the eye was not direct, it seemed to have been caused by the missile striking the malar bone, the shock of impact being communicated to the bony wall of the orbit. In some cases where epiphora resulted, this did not give much trouble in the ordinary way, but when playing games in a high wind, or motoring, the overflow of the tears was a nuisance. He thought the cause was hypertrophy of the inferior turbinate due to exposure to the winds, and as a result of its engorgement pressure was exerted on the tear duct. Removal of a portion of the soft tissue of the inferior turbinate seemed to cure this climatic cause of overflow.

Mr. G. H. Pooley said orbital cellulitis was often due to extension of inflammatory trouble in the superior ethmoidal sinus or from the lacrimal apparatus. In children, orbital cellulitis was often due to osteomyelitis in the frontal or ethmoidal region, and frequently these cases died. The best treatment was free incision, and the generous use of the sharp spoon. Defective vision due to nasal conditions he thought was attributable to pressure on the optic nerve, or to toxic influence of the retinal cells.

Mr. W. Stuart-Low spoke of cases in which edema spread to the canthus from inflammation of the frontal sinus. In some of the cases sent for operation, in which the middle turbinal was swollen and was blocking the passage, he avoided operation by using cocain and adrenalin, following that, after an interval, by fomentation. He did not operate until he had tried some such measures. Relieving the tension in a sinus, which might be due simply to serous fluid, was of great benefit. If these means failed, he received the patient into the hospital and incised freely under the eyes. He refrained from washing out the frontal sinus, for fear of driving infecting material into other sinuses. Removal of two-thirds of the middle turbinal often succeeded. He also made a practice of using a cage over wounds of sinuses and ears, to obviate pressure from outside, and he believed that had much to do with preventing or reducing subsequent deformity. Some of his lacrimal cases he failed to cure, and then he generally found some small foreign body was the cause of failure. He employed washing out in the case of the antrum, for its partition, tho thin, was complete. When a portion of shrapnel or casting was deeply embedded, he did not attempt removal unless it was giving the patient trouble.

Mr. Herbert Tilley showed photographs to demonstrate that ethmoidal cells and frontal sinus were developed quite early, even at three years of age. He also exhibited skiagrams of cases. He said that sometimes frontal sinus inflammation caused contralateral retrobulbar neuritis. Subjects of sinus suppuration seldom complained of eye symptoms, and even when asked directly about them did not admit such. In cases which had been referred to him by ophthalmologic colleagues, having gone to them because of retrobulbar neuritis, he seldom found sinuses involved, which he attributed to the fact that the originating nasal trouble had cleared up in the meantime. The rapidity with which eye symptoms cleared up when nasal trouble was treated seemed to show that the cause was pressure of fluid rather than actual sepsis. Radical measures should never be undertaken during acute intranasal infection; it might mean disaster to the eye, or even to life. At this stage the surgeon should be satisfied with providing free drainage. He had seen iritis, cyclitis, and some internal affections of the eye quite cured by intranasal operations. He had never seen a case of orbital cellulitis in which sinus suppuration was not present.

Mr. Lawson Whale brought out, by means of an epidiascope demonstration of selected skiagrams from his war experiences in France and England, a number of points of practical importance in diagnosis and treatment.

After a few closing remarks by the Chairman, the four openers briefly replied.

H. Dickinson.

COLORADO OPHTHALMOLOGICAL SOCIETY.

March 1, 1919.

Dr. C. A. Ringle, Presiding.

Glaucoma Simplex.

H. R. Stilwill and Melville Black, Denver, presented a man of fifty-three years who had a simple glaucoma in both eyes, and on whose left eye corneoscleral trephining had been done. The patient had come on October 3, 1917, on account of moderate blurring of vision. The pupils were rather large and sluggish, the anterior chambers shallow, and the tension of either eye 55 mm. with the Schiötz tonometer. There was cupping of both disks, more marked in the right eye. The vision at this time was R. 4/4, L. 4/5. Under eserin the vision improved and remained normal until October, 1918, when it dropped to R. 4/5, L. 4/6. On January 17, 1919, Dr. Black performed sclerocorneal trephining on the left eye, combined with iridectomy. The vision before operation was R. 4/7, L. 4/20. The vision recorded on February 18, 1919, was R. 4/7 part, L. 2/60. The anterior chamber had remained completely empty for about a month after the trephining was done, and then gradually refilled. The tension then gradually came up, but was still subnormal (17 mm.). The reduction in vision had apparently continued speedily after the operation. The glaucoma cup, which had never been marked, was about the same. Dr. Black remarked that it was a serious question what was best to do for the other eye, since iridectomy had not proved very successful in simple glaucomas. The patient was approaching the point where he could not do his bookkeeping satisfactorily. The vision in the good eye was now 20/40 part, and eserin did not seem to be holding it, but the eye was changing for the worse fairly rapidly. The tension remained about 40 mm. all the time. The visual field of this eye showed comparatively little contraction.

Discussion. J. A. McCaw, Denver, mentioned a recent report in the literature, of a case in which atropin was used in the presence of subnormal tension and brought up the vision.

Dr. Black said that the operated eye had been kept under atropin until three or four weeks ago, but that the atropin had not improved the tension.

Edward Jackson, Denver, pointed out that the field which had been shown for the operated eye had been taken on the second of December shortly before the operation, and indicated that at this time the boundary of the field was cutting pretty close to the fixation point. The boundary was probably closer to the fixation point than the chart would show, as such patients do not fix very accurately. It often happens that operations on such eyes are followed by a further limitation of the field which carries it beyond the fixation point. In one case seen in consultation some years ago, the patient could read with the eye before operation, but after operation the eye was entirely useless. The operation is not to be blamed on that account, but this is one of the risks which have to be taken in operating on such an eye. The patient should probably be advised to have an operation done on the second eye, and the best operation might be a Lagrange with a rather large iridectomy.

E. R. Neeper, Colorado Springs, was disposed to try the effect of the high frequency current, and would do a simple iridectomy on the second eye.

H. M. Thompson, Pueblo, emphasized the possibility of a toxic basis for glaucoma, and recalled a case which he had shown two years earlier in which removal of streptococcic tonsils had apparently checked the course of glaucoma.

C. E. Walker Denver, thought that it was seldom found that the points which Dr. Thompson had mentioned had anything to do with this form of glaucoma. A decrease of vision after operation was fairly frequent. As to the second eye, the reduction of vision under the best treatment made iridectomy the thing. In association with the iridectomy it would be advisable to use the procedure of Priestley Smith, scleral puncture with a Lang knife (slightly smaller than the Graefe), then through an incision one-fifth the corneal circumference to make a large iris excision, cutting first to one side and then to the other, and pulling on the iris until it tore.

Dr. Stilwill stated that the patient's physical condition had been gone over thoroly, but his teeth were perfect, and he had never had any illness apart from the eyes.

Dr. Black did not feel disposed to do posterior scleral puncture except as a last resort in blind and inflamed eyes. He was afraid of cutting a large choroidal vessel.

Dr. Walker said he had never cut such a vessel in doing this operation.

Keratoconus.

H. R. Stilwill, Denver, presented a man of thirty-four years the vision of whose eyes had been failing for the past six months. The uncorrected vision of the right eye was 1/60, of the left eye counting fingers at two feet. With R. —15.50 sphere combined with —3.50 cylinder axis 145 degrees the vision was 4/60, and with L. —15.50 sphere combined with —3.50 cylinder axis 60 degrees the vision was 4/15. There was marked conical cornea in each eye. The patient had been given a weak solution of pilocarpin. No disturbance of the corneal tissue except the conicity could be made out. The periphery of the cornea and of the anterior chamber could be seen thru the conical cornea better than with most eyes.

Melville Black, Denver, thought that we were disposed to overestimate the amount of astigmatism in these cases. He had found it pay to start in arbitrarily with an estimated plus cylinder and work behind it with a minus sphere, afterwards adjusting the axis of the cylinder.

J. A. McCaw, Denver, had found it advantageous to test such cases under pilocarpin.

Edward Jackson, Denver, advised treating these eyes with pilocarpin over long periods.

Vernal Conjunctivitis.

E. R. Neeper, Colorado Springs, presented a young man of eighteen years both of whose upper eyelids presented on the tarsal surface the typical cobblestone formations of vernal conjunctivitis. There had been the usual symptoms of redness, itching, swelling of the lids, and watering of the eyes, with improvement in cool weather. A sister had the same symptoms with a good deal of pain. The enlarged papillae inside the upper lids were rather distinctly pedunculated. The cornea of the right eye presented a superficial ulcer a little above the center. X-Ray and radium treatment had been advised, but not been used to date.

Discussion. Edward Jackson, Denver, referred to a case which he had reported some years previously to the Colorado Ophthalmological Congress. This patient had recently returned. He had got into the naval training school, but was finally turned down on account of his eyes. He had recently been put under radium, with beneficial results.

Shrunken Eyeball Following Pneumonia.

C. O. Eigler, Denver, presented a girl aged four and a half years who was said to have had pneumonia with convulsions at two and a half years, and to have subsequently developed severe pain in the head over the left eye, lasting eight days. Upon recovery from this condition the eye turned in and was blind. The eyeball was small, sunken in the socket and soft. It was still sensitive to light in the mornings.

Discussion. Melville Black, Denver, believed that the original condition had been a choroidal disturbance metastatic from pneumonia. It was probably better to leave the eye in a growing child, postponing the question of removal for later consideration.

Edward Jackson, Denver, suggested that if there was no irritation from the eye, it was just as well to leave it alone. It was, however, the sort of eye which might produce sympathetic irritation; and this, while not likely to destroy the other eye, might interfere with the use of the good eye. As regards the development of the orbit, Dr. Jackson had seen a girl of 16 whose eye was removed some fourteen years previously, yet it was impossible to discover any difference in the development of the two orbits.

C. E. Walker, Denver, emphasized the fact that in most ot these old cases of choroiditis there was later on a bony formation which acted as an irritant, so that he believed it would be better to remove the eye before such a condition developed.

J. A. McCaw, Denver, asked how an opticociliary resection would serve in this case.

Dr. Black replied that enucleation would probably be better if the eye were keeping up interference with the use of the other eye.

Strabismus Under Voluntary Control.

W. C. Bane, Denver, presented a man of twenty-one years who had had a diverging strabismus of the left eye since childhood, without other symptoms. The divergence was probably sixty or more centrads, but was made difficult to measure by the ability which the patient had to draw the left eye in so that it was in line with its fellow.

Discussion. C. E. Walker, Denver believed that in such a case the best operation would be an advancement, with in all probability a tenotomy at the same time.

E. R. Neeper, Colorado Springs, had never had much success with advancement, but got better results with resection.

Steel in Anterior Chamber.

E. E. McKeown, Denver, presented a man whose left eye had been struck by a small piece of steel while he was driving a pin into a wheel. The foreign body had become embedded near the center of the cornea, and the home physician had unsuccessfully attempted its removal. On examination by Dr. McKeown the cut in the cornea was found, but no foreign body. The steel had apparently been pushed into the anterior chamber, in the angle of which it was shown by the X-ray, altho invisible to the eye of the examiner. Was it possible to remove the peace of steel from this location, or should it be left in place?

Discussion. Melville Black, Denver, suggested the possibility of bringing the tip of the hand magnet into contact with the foreign body, but thought it might be well to wait a while and see what happened.

C. E. Walker, Denver, recommended the use of small tips for attachment to the giant magnet.

Edward Jackson, Denver. The value of the giant magnet is that it works at a longer distance. There is less power right at the tip of this giant magnet than there is an inch or so away. The small tips attached to it make it very much more more serviceable. A Dutch ophthalmologist has recently written a valuable paper on the withdrawal of foreign bodies from the anterior chamber. He uses a T-shaped incision, an incision parallel to the margin of the cornea, and an incision at right angles to it; and thus succeeds in getting out foreign bodies which cannot otherwise be got at.

Sarcoma of the Ciliary Body.

H. M. Thompson, Pueblo, reported a case of mixed cell sarcoma of the ciliary body. The patient, a woman of forty-four years, first experienced visual disturbance in the right eye in November, 1915. There was a gradual development of pain in the eye and on the same side of the head. A little over three weeks later, after having failed to obtain relief from a nasal operation done by a traveling surgeon, she consulted Dr. Thompson. The eyeball was stony hard, the lens cataractous, and the general condition of the eye was that of absolute glaucoma. On opening the enucleated eyeball, a light gray mass, the thickness of a small pencil and slightly flattened, was found behind the iris, and taking origin from a definite point in the ciliary body. The other end of the cylindric mass was free in the vitreous. The ciliary body was not infiltrated by the sarcoma, nor had any other tissue of the eye seemed affected except by the changes incidental to the glaucoma. Dr. C. W. Maynard, pathologist, reported the tumor to be a mixed cell sarcoma practically free from pigment.

Calcareous Lens in Anterior Chamber.

Edward Jackson and Melville Black, Denver, exhibited a calcareous lens which had been removed from the anterior chamber, into which it had apparently migrated after remaining for a long time in the vitreous. The patient, a woman of fifty years, had apparently undergone two operations, at the first of which iridectomy was done on account of previous inflammation which had left the pupil adherent to the lens, and at the second of which (three years ago) the cataractous lens had been pushed back into the vitreous. The lens had come foreward in the anterior chamber three weeks ago, and had stayed there. The shrunken lens, yellowish white in color, was removed through a large corneal incision above. A more than the normal amount of aqueous humor escaped, the excess being regarded by Dr. Black as having come from the portion of the vitreous which had contained the dislocated lens. The eye then collapsed badly, but after waiting ten minutes it was possible to remove the cataract from the anterior chamber with a wire scoop. The wound healed readily and almost without reddening the eyeball. The extracted lens proved to be calcareous shell, six or seven millimeters in diameter.

Wm. H. Crisp, Secretary.

CHICAGO OPHTHALMOLOGICAL SOCIETY.

A regular meeting was hald March 17, 1919, with the President, Dr. William L. Noble, in the chair.

Gumma of the Iris.

Dr. N. C. Nelson exhibited a young man with a tumor of the iris which was diagnosed as a gumma. Patient had been placed under treatment with mercurial inunctions and the iodids, and the gumma had begun to disappear.

Dr. Noble asked how long it was since the iodids were begun, to which Dr. Nelson replied about two and a half weeks.

Xeroderma Pigmentosum.

Dr. Nelson also showed a patient stating that the case really did not belong to this department except that one could see the thickened condition of the lower lid and the ectropion, and in these cases the cornea generally became ulcerated. In other words, there was an ulcerative keratitis. The condition was known as xeroderma pigmentosum and generally began in the very young. It began from six months up to four or five years. The pigment very much resembled freckles which appeared on the exposed surfaces, such as the face, neck and extremities. The pigment became deeper, and a little later on there was a warty appearance as was seen in this case, and still later ulcers developed. The tendency was for this condition to take on the malignant epithelial type. The prognosis was generally fatal. The sun and wind were the causative factors of this condition.

As far as treatment was concerned, there did not seem to be any outside of palliative treatment.

Up to 1870 there had not been many of these cases noted and reported, but between that time and 1910 there had been something less than 100 cases recorded in the medical literature of the United States.

DISCUSSION: Dr. Alfred Murray stated that in Fuchs' clinic, where over 20,000 new cases were seen annually, only two of the type presenting the condition described by Dr. Nelson were seen by him during the year that he was there; showing the rarity of this very interesting pathologic condition. These two cases were in sisters.

Dr. Nelson stated that the body was free from pigmentation where it was not exposed to the wind or sun. There was pigment on the hand, but as one went above where the clothes protected the body this pigment did not manifest itself.

There were no more cases in the same family. Occasionally more than one case was known to develop in a family. One physician had reported seven such cases in one family of which there were thirteen members.

One characteristic of the disease was that if the epithelial growth began early, the termination was likely to be more rapid than when it began late.

Dr. Smith asked Dr. Nelson why he did not treat the case of xeroderma pigmentosa with the X-ray.

Dr. Nelson replied that the case was sent to a leading skin specialist in Chicago in the first place, and he asked the specialist why he did not use the X-ray treatment, and his answer was that the disease was not favorably affected by the X-ray.

Hemorrhage Into the Vitreous.

DR. CARL O. SCHNEIDER reported the case of a man who, six weeks ago, had been hit in the eye with a pair of brass knuckles, which caused considerable hemorrhage into the vitreous.

Double Paralysis of the External Recti Muscles.

DR. E. R. CROSSLEY showed a case of double paralysis of the external recti muscles that had been operated on recently by Dr. Woodruff, who resorted to the transplantation of the external half of the superior and inferior recti muscles. The man was struck on the back of the head about six months ago, shortly after which this paralysis developed.

Dr. Von Der Heydt asked for further information regarding the case of double paralysis of the external recti.

Dr. Crossley stated that the object in showing the case was to refer to the transplantation of the superior and inferior recti muscles. This operation was described by Dr. Woodruff two years ago before the American Medical Association, at which time Dr. Woodruff reported two cases on which he had performed this operation. This was the fourth case. Advancements were done on both external recti before Dr. Woodruff had operated.

Dr. Noble asked whether there was any pull by either of the external recti.

Dr. Crossley replied that there was pull in both eyes. In the left eye there was a little deviation upwards, and Dr. Woodruff had attempted to correct that, but with what result he did not know.

Dr. Noble asked how long it was since the operations were done.

Dr. Crossley replied about a month as regards the right eye, and there was a week between operations. The first two cases were reported in the proceedings of the Ophthalmological Section of the American Medical Association for 1917, and in this paper Dr. Woodruff covered quite extensively the subject of transplantation of tendons elsewhere and in the eye. There was only a few such cases reported before that time.

Dr. Von Der Heydt said that two years ago he saw a case similar to the one shown by Dr. Crossley of paralysis of both abducens nerves in the same individual. It could not be justified anatomically at all. It should not be called a paralysis of both external recti. The literature maintained that these cases were usually a convergence spasm, and that the origin of it was either some irritation in the brain, hysteria, or possibly multiple sclerosis.

Dr. Crossley stated that trauma was excluded in these three casas. He did not see how external trauma could paralyze both external recti, nor could he say anything about the origin of it any more than that the man was struck months ago and fell on the back of his head, and that was the beginning of his trouble. The man had gone through the operation of advancement of both external recti some time before, and had had no previous trouble.

Dr. Nelson said the man had had no previous trouble. He was on a drunk, got into a scrap, and came to the clinic the next morning with both external recti paralyzed. At present, after operation, he had considerable motion in the right eye, but in the left it was not quite so marked. The last operation on the left eye was only done March 14, 1919.

Enucleation of the Eyeball Under Local Anesthesia.

Dr. Austin A. Hayden read a paper on this subject in which he stated that local anesthesia, since Koller introduced cocain in 1884, had been the procedure par excellence in nearly the entire realm of ophthalmic surgery. Today general narcosis was not uniformly employed in eye operations except on the very young and extremely nervous patients; in septic conditions, where injections might carry infection to other tissues; in extensive plastics and in enucleations. In some of the last named the use of chloroform or ether might be so dangerous to the life of the patient as to be almost absolutely contraindicated. Local anesthesia then became a matter of necessity. A most satisfactory result in a case of this sort had prompted the presentation of his paper.

After detailing an interesting case in which he enucleated the eyeball under local anesthesia, he referred to the advantages or indications for local anesthesia in general: 1. Dangers and complications of general anesthesia are entirely eliminated. Among these are the immediate dangers, such as respiratory and cardiac failure, chloroform and ether poisoning and shock, as well as remote complications, such as postoperative and hypostatic pneumonia, myocarditis, and nephritis.

2. It is impossible to remove the wrong eye.

3. No preparation is needed, so that the operation can be done at once, and it is not necessary for the patient to be purged or starved.

4. No assistant is necessary.

5. The surgeon is relieved entirely of worry in regard to the patient's life.

The contraindications of local anesthesia are few: 1. Extreme youth or extreme nervousness on the part of the patient, probably also the latter on the part of the operator.

2. Purulent conjunctivitis and panophthalmitis, where theoretically a dissemination of the infection might result from injection of the anesthetic solution used.

3. Ruptures of the globe from panophthalmitis.

The author quoted extensively from the literature favoring enucleation under local anesthesia.

Discussion: Dr. Alfred N. Murray stated that Uhthoff in Breslau had done a great many enucleations under local anesthesia. After the muscles were released, he injected the cocain solution into the region of the ciliary nerves at the back of the eyeball through a long curved needle. The patients were able to talk to him during the operation and complained of no particular pain. The results were excellent. He did not think of giving a general anesthetic except to young children and nervous people, and ordinarily the patients came thru without any trouble whatever.

Dr. Thomas Faith stated that for a number of years Dr. Fisher and Dr. Hoffman had both done a number of enucleations under local anesthesia. Dr. Hoffman preceded the local anesthesia with H. M. C. He had personally done a few enucleations under local anesthesia, but the technic described was one that he had not followed. In injecting the muscle attachments no attempt was made to penetrate the globe. He believed that the administration of the H. M. C. facilitated the work. He had done a number of enucleations with the aid of this combination under local anesthesia in patients who were so nervous that he was unable to do the work with local anesthesia alone, and yet they were patients to whom he did not wish to administer a general anesthetic. In his last case he resorted to the use of apothesin, a local anesthetic produced by Parke, Davis & Company, and said to be of no value except for injection into the tissues. It is of no value as a local anesthetic when applied to the mucous membrane. The result was satisfactory if the H. M. C. was given according to instructions. The first injection was usually given an hour before the operation and the second one was given half an hour before the patient was put on the operating table. Towards the close of the operation the effect seemed to be very satisfactory, and the patient experienced no pain whatever when the nerve was cut. Deep injections were made with the two per cent apothesin, the same as subconjunctival injections into the muscle sheath, and no cocain except four per cent solution was used and that was instilled at the beginning. One could use large quantities of apothesin; as much as two ounces had been given subcutaneously for extensive superficial operations and no deleterious effects ensued.

Dr. H. J. Smith asked why the essayist did not use novocain, which he thought was safer for the patient if he wanted to use any quantity. The injection should be made in the loose tissue of the orbit. Unless one placed the cocain solution very accurately he could hardly accomplish his object without using too much. With novocain one could infiltrate the entire orbit and cover the ground very well and at the same time keep within the bounds of safety.

He also asked Dr. Hayden why he injected cocain into the vitreous chamber. There might be a reason for this, but it was not apparent to him.

Dr. William A. Mann said he had operated on two cases and was pleased with the operation. He did not think it necessary to go through the eyeball to anesthetize the tissues back of the eyeball, as those same tissues could be reached by rotating the eyeball after the recti muscles had been cut. In the two cases on which he had operated the pain was not entirely relieved, although if he were to have the operation done on himself he would prefer local anesthesia to ether unless there was very marked sensitiveness of the ciliary nerves.

Dr. Hayden, in closing, stated in regard to the use of hyoscin, morphin and cactin that it properly came between local and general anesthesia, but he could readily see how it would be a distinct help for any local anesthetic procedure that might be attempted. Of course, the hyoscin was a powerful toxin and even in small quantities should be used very guardedly, and he did not know whether the use of those drugs together with the cocain that was employed was a good thing if a satisfactory degree of anesthesia could be obtained by the use of cocain alone.

As to the penetration of the globe, he simply wanted to try it. He figured it out this way: it was perhaps easier to penetrate the globe and reach the terminations of the ciliary nerve that lie around the optic nerve instead of going back of the ciliary ganglion along the path of the external rectus muscle. There was a difference in depth of about an inch. The ganglion was located nearly two inches back, whereas going straight through the globe the termination of the same nerves could be reached fully an inch further forward. It seemed to him that puncture and counterpuncture of the globe was attended by absolutely no risk, although he had only done this in one case. It was apparently quite easy to strike the sclera just to the temporal side of the optic nerve, and on the second injection to strike it just to the nasal side of the optic nerve by rotating the needle about fifteen degrees.

Dr. Martin, from South Dakota, who happened to be in Chicago at the time, had witnessed the operation, and he felt that the severance of the optic nerve would be attended by great pain. So far as the speaker knew, the optic nerve itself was absolutely insensitive, but the small nerves which lie close to the optic nerve just before they perforate the sclera were sensitive. This was what was meant by saying that dividing the optic nerve might be attended by a considerable amount of pain. It was not the pain from the cutting of the optic nerve itself but the ciliary nerve branches in the vicinity. Lastly, if he was unfortunate enough to have to do many of these operations he would resort to local anesthesia.

As Dr. Murray had remarked, enucleations were done under local anesthesia as a routine procedure, in certain European clinics (notably in Paris). More of these operations could be done here in America, especially in selected cases, with great advantage to patient and operator as well.

Dr. Noble asked Dr. Hayden if he thought with a plus three tension he could have manipulated the eye without pain under cocain anesthesia, if he had not opened the sclera and reduced the tension?

Dr. Hayden, in replying, stated that he had the feeling the intraocular injections could not have been made without causing great pain unless the tension was first reduced.

In answer to Dr. Smith, he stated that there was no particular reason for the injection of the cocain inside the globe except this: The chances were it would be rather slowly absorbed into the circulation from the globe cavity, and that it was at least not dangerous if given in this location. In the second place, there might have been some chance of reaching the region behind the nerve through the return ciliary circulation.

Lenticular Lens for High Myopia.

Dr. Carl O. Schneider remarked that when prescribing concave lenses of about ten diopters or more, we were well aware of the excessive weight and thickness, and of the conspicuous rings or reflections of the edge that were present in concave lenses of the ordinary form.

To overcome these objections, the well-known lenticular lens, consisting of a plano or perfectly flat piece of glass with the concavity ground in the center, had long been in use. This form of lens gained only a slight reduction in weight and thickness, and it had the disadvantage of only a small concave area, and this area could be increased in size only at the expense of the objectionable added weight and thickness.

It occurerd to him sixteen years ago, while studying optics, and making diagrams of the course of a ray of light through various forms of lenses, that the combination of concavity in the center of a convex piece of glass would produce a lens suitable for the correction of a high degree of myopia, and which would contain a much smaller amount of glass, and at the same time admit of a larger concave area, than did the ordinary lenticular or any other form of concave lens then available.

Upon inquiry, he found that no lenses of this type had been made, and certainly none like it were in use before the time he applied for the patent which covered the subject of this paper.

He quoted from specifications on Patent No. 744,982 that was issued to him November 24, 1903, as follows: "The present invention consists in forming a concave lens by grinding a central concavity of the desired curvature in a main body portion of the required dimensions, and which body portion is of a double-convex, a plano-convex, or a compound-convex form. As so formed a concave lens for spectacles and like uses is produced containing a much less quantity of glass for a concave lens of a given focus and size than it had been possible to produce heretofore. The present invention also renders it possible to grind a concave lens with thin edges, and thus entirely eliminate the numerous objectionable and annoying reflections or rings which appear in a concave lens of the ordinary form. In addition to the foregoing, the present invention affords a lens of a neat and pleasing appearance, and its thinness at the margin permits of a very ready, neat, and substantial attachment to the spectacle rim or to the straps of a rimless mounting.”

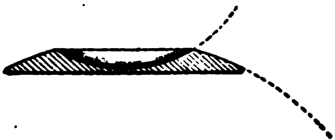


Fig. 1.

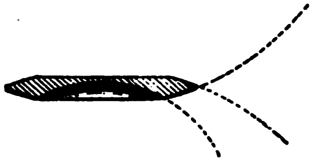


Fig. 2.

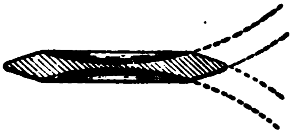


Fig. 3.

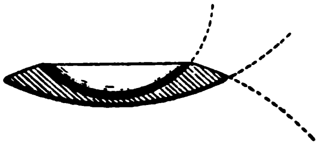


Fig. 4.

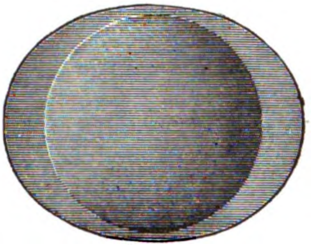


Fig. 5.

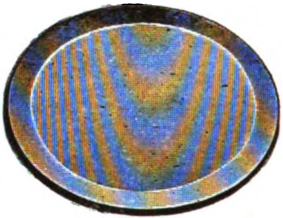


Fig. 6.

Figs. 1-6. Schneider's Lenticular Lens for High Myopia.

With the aid of the toric lens surfacing machine, it was possible by applying this same principle to produce the concave surface in an oval form, and the Schneider oval lenticular lens was undoubtedly the most beautiful concave lens that it was possible to prescribe for a patient having a high myopia.

In the author's experience, myopes of ten diopters or over would gain sufficient advantage by reduction in weight and by improved appearance to warrant the use of some form of this lens; but it was particularly in cases requiring a correction of about —20.00 D. or more that the patient was considerably benefited and invariably delighted with this new form of lenticular lens.

In obtaining this patent, the object was merely to definitely establish the fact that he had made this slight contribution for the good of humanity. No restrictions had ever been imposed against the free use of these lenses. No fee or royalty had ever been charged or collected under this patent, and he was permitting all optical shops to make any of these lenticular lenses without any financial obligation to him whatever.

Discussion: Dr. Michael Goldenburg said he had been familiar with the Schneider lenticular lens, but did not know that a member of the society or resident of Chicago was the inventor of it. He had been using this lens for a number of years; it was a beautiful thing and gave much finer and clearer vision than any lens on the market.

Dr. Robert Von Der Heydt stated that owing to the present tendency toward larger lenses, the myope especially was very badly handicapped.

He had been using these lenses for years, and also used the toric lenticular lens in which the bevel edge was toric instead of plus sphere. It gave an oval instead of a round field, which made it a good looking lens. There was one optical company which produced a similar lens by beveling the edges by hand on the grindstone. He thought it would be a good idea to make these thick lenses out of flint glass having a higher index of refraction. In this way we should get a thinner lens diopter for diopter than with the usual crown glass.

While the subject of lenses was up for discussion, he would like to mention a very great and seemingly unavoidable defect created by prescribing kryptok bifocals where one eye was quite different from the other in refraction in the vertical meridian. When, for instance, one prescriped a lens for an individual that had minus two sphere for distance for one eye, and only minus one sphere in the other eye, a difference of a diopter, he was creating a hyperphoria. By using a prism in the lower segment that could not be avoided. In any individual, where there was a difference in the refraction of one eye as compared with the other in the vertical meridian, that difference would manifest itself in the reading segment by about as many tenths of degrees of prism as the difference in diopters. One was artificially creating a hyperphoria which could not be avoided in kryptok lenses as made at present. (Here Dr. Von Der Heydt illustrated the point by the aid of diagrams.)

At the request of the president, Dr. Schneider explained how the lens was ground and described the mechanical methods that were used by opticians in producing it.

Alfred N. Murray, Sec.

ABSTRACTS

H. Weve.—Epidemic Parotitis with Iridocyclitis.—Tydschr. v Geneesk. Feb. 23, 1918.

Weve reports three cases of this disease, where he can exclude, with much greater certainty than Heerfordt could in 1909, tuberculosis, lues and pseudoleukemia; and he accepts on epidemiologic and clinical grounds as cause of the common epidemic parotitis.

It seems contrary to the literature that chronic iridocyclitis should be not a very rare localization of the virus of the epidemic parotitis. But this can be explained, as in most cases the iridocyclitis precedes some weeks the appearance of the parotitis. The parotitis is then considered as an intercurrent disease, for which the patient is treated by his family physician; and of which the ophthalmologist in most cases does not hear. Only in rare cases where the parotid swelling remains for a long time has the ophthalmologist a chance to think of a connection.

Case 1. A 14-year old boy came with a double iridocyclitis to the clinic. The eyes were externally pale. The pupils reacted well, and there were some Descemet spots, fine posterior synechiae, and marked optic neuritis with slightly curved and strongly filled vessels. R. V.=5/5 Temp. in bed (three weeks after the onset) normal. Only once the evening temp. was 37.8° in axilla. Leucocytosis. Tuberculin TR up to 20 mgr. subcutaneously never showed any reaction. On discharge no Descemet spots. In L. only a few fine posterior synechiae and some fine vitreous dust and slight optic neuritis.

Four or five months after the first attack the patient returned with a marked painless double swelling of both parotids. The recurrence came without pain, and at the same time L., which had remained pale, had become strongly injected and painful. Fresh Descemet spots and a distinct optic neuritis were present. The lymphocytosis was somewhat increased, compared with the first attack. Some two months later, while the parotid swelling was still present a nodule formed in the left iris. No more Descemet spots were present. At the same time some ten fresh Descemet spots appeared in O. D. and a nodule in the chamber angle, which looked somewhat like a beginning gumma. Slowly a double nodular iritis developed, which looked especially menacing in R. Strong increase of the number of Descemet spots, deep blue-red pericorneal injection, edema of the cornea especially down, diminution of V. in R. to about 1/4. Three injections of 20, 15 and 8 cm. subcutaneously of serum from a patient, who had recovered from epidemic parotitis were tolerated without disturbance or reaction. No favorable influence upon the ocular process was noted. The nodules grew in both eyes, the Descemet spots increased. Von Pirquet reaction was again negative. Radium was tried. R. was treated with 5 mgr. during 10 minutes, in 8 weeks 15 times. Fourteen days after the beginning distinct improvement was visible. The Descemet spots were reduced in number and size as against L., which had not received the rays. A month after the beginning the nodules in R. had become smaller, and three weeks still later they were nearly absorbed, the Descemet spots could be counted. Six weeks after the beginning the radium treatment R., which for a year had been refractory to every treatment, was entirely cured. V. after correction=1, 5.

As L. did not progress it also was treated, but to reach a quicker result the sitting lasted 20 minutes, nine in five weeks. This improved also, within 14 days. Within four weeks the large tumor had entirely shrunken and the hundreds of Descemet spots had disappeared except a few. V., which was before the radium treatment ⅓ improved to ¾. Condition half a year later: R. a few Descemet spots centrally. V=5/4+. L. a number of fine Descemet spots are visible down, optic nerve not sharply defined, V.=5/4—.

Case 2. Mother of three healthy children, 28 years old. On February 1 peripheral facial palsy on the right side, which was healed three weeks later. A week after the beginning swelling of the left parotid; three weeks after this the right parotid also began to swell. After some two to three months they disappeared slowly. The lacrimal glands were not affected. In the middle of June the patient came under observation. She states distinctly that some weeks before the facial palsy L. had become cloudy. Only five weeks thereafter, therefore about the same time of the right sided parotitis, R. became blurry. In November V. was in each eye=1. Some fine vitreous dust and very fine, partly brown Descemet spots are still present. The strong posterior synechiae did not loosen.

Case 3. A 15 years old girl, had not been sick. L. began to blurr in the middle of April, and became red. A week later the left cheek, and again a week later the right cheek became swollen; and two weeks later R. became inflamed. Four or five weeks after the beginning of the inflammation of L. a left facial palsy appeared, which remained about a month. The menses stayed away during five months, after the beginning of the ocular affection. The painless swellings of the parotids had disappeared after two weeks. The ocular inflammation was not entirely cured after four months; then the condition of both eyes became worse and the patient presented herself at the dispensary. She was taken in the hospital and remained two months. R. being the worst was treated with radium twice a week during 15 minutes, 5 mgr. radium in copper tube with mica-plate. She received 20 treatments. After a few weeks, improvement set in. L. improved spontaneously. Three months after the beginning of the treatment only a small residue remains of the Descemet spots with a rather sharply limited opacity in the deepest corneal layers (=the toxic edema of Straub). A few small vessels go toward this infiltrate. After correction V.=¼, optic nerve very red. In L. a central group of the Descemet opacities with corresponding deep infiltration, a small deep infiltration medium and down and a few iris vessels, strong optic neuritis corrected V=1/6. [See A. J. O. June 1918. p. 433-4.] E. E. B.

Pacheco Luna. Study of Trachoma in Guatemala. (Guatemala, 1918.)

The author has found trachoma an exceedingly rare disease in Guatemala. In twelve years of practice, he has not been able to find the disease in creoles or natives. All are imported cases, which, he asserts, lose rapidly their contagiousness and do not infect natives, notwithstanding the bad hygienic surroundings and crowding prevalent amongst the people in cities.

He attributes this attenuation of virulence to the climate, but mentions also the fact that in France trachoma is rare, and not transmissible, the poor trachomatous Jews of the Bastille Borough in Paris, enjoying full liberty and never transmitting the disease to relatives.

The same thing happens in Mexico, where true trachoma is very rare. In the reviewer's experience only three in 1,000 of his dispensary cases developed trachoma. This rarity, however, is probably much more dependent on the scarcity of immigration than on climatic conditions. In some places of Mexico where immigration is active the number of trachoma cases increase and the natives are also infected. The same occurs in Argentina, according to Otto Wernicke.

URIBE TRONCOSO.

Lhermitte, J., and **Saint-Martin, de. Primary Polioencephalitis with Narcolepsy.** Ann. d'Ocul., 1918, v. 155, p. 487.

The authors report three cases appearing during the course of an epidemic in the early part of 1918, generally known as "Lethargic Encephalitis." The predominant features of this disease are ocular paralysis, narcolepsy or somnolence and alterations in the general health. The ocular manifestations are found in the initial stage, either preceding or closely following the somnolence. Unilateral or bilateral inward deviation of the eyeball and ptosis are the most striking ocular symptoms. In the first two cases of the authors, there was almost complete paralysis of all the branches of both motor oculi, altho the different branches were unequally affected. In the third case, the external rectus of each eye was affected. A review is given of the general symptoms and eye findings as shown by the experiences of other authors. The characteristic of the ophthalmoplegias is that they are disassociated and migratory. This, with the somnolence, would indicate a lesion in the peduncular region, that is of the nuclei of the III and VI nerves and possibly their connecting fibers. This has been confirmed by postmortem findings. It is an infectious disease, the agent of which has not been identified.

C. L.

Frenkel, H.—Prognosis and Treatment of Ocular Wounds Due to Penetrating Foreign Bodies.—Archives d'Ophtalmologie, July-August, 1918, Vol. XXXVI, p. 193.

The fact that wounds of the globe due to penetrating foreign bodies give a much better prognosis in civil than in military life is due to the fact that in civil life the foreign bodies are, as a rule, single, whereas in military life they are generally multiple. This fact can often be determined by radiography of the eye in situ, but becomes much more apparent when radiography of the enucleated eyes is practised. This explains why in war work enucleation is often found necessary even after an easy and seemingly successful extraction with the magnet. In 59 out of 100 enucleated eyes chosen at random foreign bodies were found; 21 of the 59 showed a single foreign body, 38 more than one, one having more than 17, and 4 metallic dust. Most of these bodies were so small that their extraction was impossible even with the strongest magnets unless by chance the magnet came very close to them. In two cases there remained a second foreign body in the eye after the first had been extracted with the magnet. In spite of its drawbacks the large magnet is the more useful, the small magnet often giving negative results. Sometimes repeated applications of the magnet will be crowned with success; presumably the foreign body gets shifted into a position more favorable for its extraction.

M. W. F.

American Journal of Ophthalmology

Series 3, Vol. 2, No. 6 June, 1919

PUBLISHED MONTHLY BY THE OPHTHALMIC PUBLISHING COMPANY

EDITORIAL STAFF

ADOLF ALT,
Metropolitan Bldg., St. Louis, Mo.
M. URIBE-TRONCOSO,
143 W. 92nd St., New York City.
MEYER WIENER,
Carleton Bldg., St. Louis, Mo.
CASEY A. WOOD,
7 W. Madison St., Chicago, Ill.
HARRY V. WÜRDEMANN,
Cobb Bldg., Seattle, Washington.
EDWARD JACKSON, *Editor,*
318 Majestic Bldg., Denver, Colo.
CLARENCE LOEB, *Associate Editor,*
25 E. Washington St., Chicago, Ill.

Original papers and books for review may be sent to any member of the editorial staff. Reports of society proceedings, correspondence, and other scientific communications should be addressed to the Editor.

Proof should be corrected and returned within forty-eight hours to the printer. Reprints may be obtained from the printers, Tucker-Kenworthy Co., 501 S. La Salle St., Chicago, Ill., if ordered at the time proofs are returned.

Subscriptions, applications for single copies, communications with reference to advertising or other business, should be addressed to
H. A. FOX, Manager, 7 West Madison St., Chicago, Ill.

THE EYES OF THE AVIATOR.

If aviation had been achieved thru an evolutionary transition extending over countless generations, like that from the fish to the bird, it would have been attended with the perfecting of physical organization by the weeding out of countless defects, little noticed and of trifling importance while we walk on the earth, but fatal when we attempt to mount into the air. Among such defects, previously little thought of, are some of the eye and vision, that rise to tragic prominence with attempts at flying.

To speak of the air service as "the eyes of the modern army" is to keep as near the truth as figurative statement ever can. Blind Samson, the sport of his enemies, might well represent an army of today without its aviators. And if, by sacrifice of his own existence Samson could inflict terrible punishment upon the enemy, still it was only "schrecklichkeit," not military efficiency.

If salt that has lost its savor is useless, what is to be said of the eye that does not see things that safety requires should be seen? A scotoma, never appreciated as a defect in the field of vision, may hide an enemy until time for effective defense is passed. Color perception only slightly subnormal might make the observer fatally slow to pierce a disguise. A minor defect of motor coördination and balance may be of no importance while a man stands with his feet on the earth, yet it means disaster when attempting a difficult landing.

The experience of war has led to the relaxation of visual requirements in many branches of the service. But for air service it teaches that they should be made, if possible, more exacting, and should be rigidly enforced.

No material relaxation of them is possible without an increase in the proportion of fatalities, which makes those inflicted by the enemy look small in comparison.

The Major in the regular army whose son has a slight macular lesion, and minute relative scotoma with disturbance of muscle balance, never before noticed, cannot understand why his boy may not gratify his laudable ambition to become a flier.

The Congressman, who does not know the difference between the accommodation of the eye, and that of obtaining a small loan from his bank, does not understand why the government should be put to the expense of a physiologic laboratory like that at Mineola. Yet the Major would be inconsolable for the death of his son in the smash of a bad landing; and the Congressman would declaim most eloquently against the sacrifice of $50,000 airplanes to say nothing of the expense of the training and lives of needed officers thru the temporary disabilities produced by altitude or training in stunt flying necessary for attack or defense in the air.

There is great need for scientific men to acquaint themselves with the facts regarding the physical requirements for safe and successful aviation; and then to exert themselves actively in producing a public opinion that will support rigid requirements for the aviator, and scientific study of all the difficulties he has to meet and overcome. The book on Air Service Medical, elsewhere noticed in this number, should be read and studied by every oculist who wishes to keep in touch with the newest and most suggestive phases of medical thought; and at the same time get a new point of view for the functions and diseases with which he has to deal in his daily practice, and fit himself to perform his educational duty toward the public.

E. J.

RELATIVE SCARCITY OF TRACHOMA ON THE PACIFIC COAST.

Rarely does a writer remark upon the paucity of clinical material; rather is it true that he selects a subject for which he has gathered as many cases as possible.

This writer has been struck with the fewness of trachoma patients whose home is in the Pacific Northwest. This is the more remarkable because our population is easily eighty per cent transplanted from other sections of America, with a great mixture of the foreign element from all parts of the world. Of the latter there are race elements prone to this disease;—the Swedes and Norwegians, those from the Levant, Southern Europe and the Japanese. Odds and ends of peoples are found; even the Spanish-speaking Jews from the Marmora seacoast of Turkey, and as a contrast occasionally an Eskimo.

The coast Indian tribes are not at all afflicted with trachoma, while those east of the Cascade Mountains, and particularly those east of the Rockies, have quite a high percentage of sore eyes from this disease.

The writer finds quite a contrast in the last 10 years of his practice to the two decades spent in the Great Lakes Regions, as regards the prevalence of trachoma in private practice. His recent experience in Army Service corroborates the opinion that the affliction is not only not endemic in the Northwest, but that practically all cases here are imported, few arise de novo, or few contagions result.

We must then ascribe the relative immunity of our inhabitants to the climate, to the absence of dust and flies; —due to the cool, equable and moist climate as well as to the character of the soil, which is mostly a loam upon gravel or hard pan, there being little fine sand or clay to form dust. Then, too, our people live largely out of doors, even during our winter weather.

Conditions are different over the mountains where the intense heat of the summer with its dust and dirt and the rigors of the winter, with the fouler air of house living, give local causes of ocular irritation. Now are these not provocative causes for trachoma? Certainly the refractive conditions with the eye strain are not different here, neither are the other alleged causes of the disease. Thus the writer comes to the conclusion regarding trachoma that the moderate climate of the Northwest Pacific slope is a favorable factor for its cure; and that these cases do not obtain here as often as elsewhere.

H. V. W.

OPHTHALMOLOGY FOR MEDICAL STUDENTS.

When American Medical Schools granted the M. D. after two courses of five months each; and the clinical teaching consisted of lectures to a hundred or two hundred students, with a patient for a text; or an operative exhibition where a dozen nearest the patient could observe part of the technic; and when the student could graduate without even looking thru a microscope; ophthalmology was supposed to be well treated if it received any attention at all.

The medical course has lengthened from 10 to 36 or 48 months. Clinical teaching includes section demonstrations, ward walks, individual study of assigned cases, and practical hospital interne work. The laboratory buildings are the chief buildings of the medical school, and in fundamental branches laboratory hours exceed those for lectures and recitations. But the improvements in the teaching of ophthalmology have not kept pace with this progress, and are not proportioned to the importance of the subject in its bearings on general medicine.

This teaching of ophthalmology to medical students in general is important to the ophthalmologist from two standpoints. It furnishes the start for his special training in ophthalmology, and it determines the point of view of the general medical profession with regard to ophthalmology, and their ability to coöperate with the ophthalmologist and appreciate the special services that he renders.

An interesting symposium upon such teaching is published in the *Edinburgh Medical Journal* for January, 1919. The writers are, E. Treacher Collins, Freeland Fergus, Wm. G. Sym, and J. V. Paterson, all competent ophthalmologists and experienced teachers. They agree that the time assigned to ophthalmology, "20 meetings," is inadequate; that 32 or 40 are needed, that most of these should be clinical, or demonstrations which might well extend over more than one hour each.

All of these writers agree that certain things of importance in general practice, like ophthalmia neonatorum or glaucoma, should be taught and emphasized. But it is pointed out that only a part of the students, one in five according to Fergus, will profit much by work in refraction.

Collins and Fergus dwell on the need for teaching every medical student to use the ophthalmoscope, Collins enumerates the questions it will settle with regard to general diseases, and its value in training to exact observation. Paterson says it should be taught as early as possible in the course, and used in every clinic in the latter clinical part of the course. Fergus would have the student become as familiar with its use as with that of the clinical thermometer.

It might be urged with even greater force that every medical student should use this instrument for the ophthalmoscopic study of pathology. A particularly weak point in the improved, extended medical curriculum is the wide gap between the study of pathologic changes in the dead body, and the study of symptoms in the living. The ophthalmoscope making possible the study of pathology, day after day, in living nervous, vascular, and connective structures, should be made to bridge this gap between fundamental and practical training; and bring laboratory exactness to the study of symptomatology.

It is a good sign when four such ophthalmologists as those above mentioned are asked to contribute to a series of discussions of general medical education. The proper undergraduate teaching of ophthalmology should be urged by ophthalmologists everywhere, until its importance is appreciated by the whole medical profession.

E. J.

BOOK NOTICES.

Air Service Medical: War Department: Air Service Division of Military Aeronautics. Octavo. 446 pages. Illustrated. Washington, D. C. Government Printing Office, 1919.

This large book, bringing up the medical history of the air service to March, 1919, will be of great interest to the medical profession in general. We can only note here the parts that refer especially to ophthalmology, and certain sections bearing on general function and nutrition that include notable effects on the eye. It is "for educational purposes that the Director of Military Aeronautics deemed it advisable to issue this book. Its object is to set forth Aviation's debt to Medicine, and to make clear the part played by the Air Medical Service in the winning of the war in the air."

This work is sharply divided into three phases, the selection of the flier; the classification of the flier; and the maintenance of the physical efficiency of the flier, In the selection the object was that no aviator should "fail in his mission against the Hun because of discoverable physical defect." The importance of this was not at first appreciated by anyone, and is still not understood by those who have not sufficiently studied the matter. The approximate statistics thus stated are startling. "When it is stated that 2 per cent of the total number of fliers incapacitated for further air service are put out by the Hun, and 8 per cent because of mechanical shortcomings of the airplane, the remaining 90 per cent looms large when it is realized that this proportion represents troubles in the flier himself."

In the light of experience, the minute investigation of the special senses and general physical fitness of applicants for the air service, that have been often adversely criticized is more than justified. Men were rejected, not because they could not fly, but because under the stress of air battle some slight discoverable weakness or tendency would turn the balance against them.

We can safely claim that never before have any large number of men undergone such minute searching and scientific examination as the fliers for the American Army.

Among these examinations the visual and ocular occupy a very important place. In the 67 units established for such examination 176 ophthalmologists took part in the work. The investigation they conducted in every instance covered the following points:

1. History of previous or present eye trouble.
2. Stereoscopic vision.
3. Ocular movements.
4. Pupillary reactions—direct, consensual, accommodation.
5. Intraocular tension.
6. Any visible lesion of the eye.
7. Nystagmus.
8. Field of vision.
9. Color vision.
10. Muscle balance at 20 feet.
11. Visual acuity — distance, near point.
12. Ophthalmoscopic findings with dilated pupil.

The schedule is one that may well be made the basis of any scheme for thoro ocular examination. The illustrations and descriptions here given of the conduct of such an investigation make this work an extremely valuable guide for anyone desiring to perfect himself in methods of ocular diagnosis.

Of the men presenting themselves as applicants for the air service, 29.3 per cent failed to pass the physical examination; and of these 5.9 failed in the eye examination alone; 7 per cent in two tests, and 8.6 per cent in three or more tests. Practically 50 per cent of those rejected failed to meet the eye requirements. Of 59 thus rejected for eye defects, 33 had low visual acuity, 10 had defective color vision, 7 imperfect muscle balance, 5 lacked stereoscopic vision, and 3 were eliminated because of the ophthalmoscopic evidences of disease.

The effects of altitude or of oxygen deficiency on ocular functions, particularly visual acuity, accommodation, the field of vision, and motor coördination is so important, and so much light has been thrown upon the subject by the laboratory researches carried on in connection with the Air Service Medical, that it will be considered separately in a later issue.

It is rarely that a volume of solid scientific worth contains so much of dramatic interest and romance. It is worthy the careful perusal of anyone who can secure it.

E. J.

Revista Cubana de Oftalmologia. Published quarterly. Dr. Francisco Maria Fernandez, Editor. Dr. Jesus M. Penichet, Secretary. Havana, Cuba. Subscription Price, $6 per year.

It is not often that a new ophthalmic journal has a chance to fill a real and long felt want; but this one has that opportunity and uses it admirably. The first number is put out as a double number covering the first half of the year 1919, and consists of 226 pages, of which 14 are given to a biographic section, 112 pages to original papers, and the remainder to progress of ophthalmology and reviews of ophthalmic journals and societies, with notices of deaths, and miscellaneous items.

The biographic section contains 6 biographies, each accompanied by a half tone portrait. Of the 24 original papers, 2 are illustrated. The paper used and the press work are good; so that the Revista Cubana makes a better appearance than any ophthalmic journal heretofore printed in the Spanish language. We know enough of the work of Drs. Fernandez and Penichet to feel sure that this will be an addition of real value to the ophthalmic journals of the world. Spanish-speaking countries, especially those of America, have recently manifested an active and productive interest in ophthalmology. Thru this channel they will have something of real worth to offer to the general store of our literature.

E. J.

Section on Ophthalmology, American Medical Association. Presession Volume for 1919. Edited by the Secretary, A. E. Bulson, Jr., pages 307. Illustrated.

This volume, altho printed and circulated, is not published. It is distributed free to those who have registered as members in attendance at a meeting of the Section within the last five years. It is the most valuable piece of free ophthalmic literature we know of. On the other hand, those whose papers are thus distributed have 1,000 or 1,200 reprints of their papers sent to the most appreciative list of readers, for much less than they could get the same number of reprints sent any other way.

It might be objected that this duplicates the volume of Transactions to appear later. In a way it does; but it adds greatly to the value of that volume by bringing out discussions of much higher value than could be had without this; and those discussions will be a most valuable part of the Transactions.

E. J.

BIOGRAPHIC SKETCHES

THOMAS HALL SHASTID

SUPERIOR, WIS.

URBAN S. BIRD. An ophthalmologist and oto-laryngologist of Tampa, Florida, well known thruout the South. Born in 1867, he received the medical degree at Tulane University, New Orleans, in 1895, and at once settled in Tampa. Ten years later he went again to New Orleans, where he studied ophthalmology and oto-laryngology for two years. Returning to Tampa he practiced there as ophthalmologist and oto-laryngologist for the remainder of his life. He was a member of the American Laryngological, Rhinological and Otological Society. and a surgeon of U. S. volunteers during the war with Spain. He also held a lieutenant's commission in the American Army during the Great War, and was honorably discharged Dec. 5, 1918. He died Jan. 11, 1919.

WILLIAM CHEATHAM. One of the best known eye and ear specialists in Kentucky. Born in Taylorsville, Ky., June 6, 1852, son of William H. and Elizabeth (Vandyke) Cheatham, he removed with his parents to Louisville while still a mere boy. In 1873 he received the degree of A. B. from the Kentucky Military Institute at Frankfort. Three years later he received the medical degree at the University of Louisville.

Going to New York, he became an intern in the Manhattan Eye and Ear Hospital and at the same time a private pupil of Dr. Cornelius Rea Agnew, that famous teacher of so many excellent ophthalmologists. Having completed his course under Dr. Agnew, he studied his specialties further in London, Paris, and Vienna.

Returning to Louisville, he began at once to practice as ophthalmologist and oto-laryngologist, and soon had an excellent practice. He was promptly given a lectureship at the University, and, soon after, the full professorship. At the time of his death he was Professor Emeritus of Ophthalmology, Rhinology, Otology and Laryngology. He was a member of the American Ophthalmological Society, and a Fellow of the American College of Surgeons.

Dr. Cheatham married, Oct. 2, 1879, Miss Nellie Garrard, who died a few years ago.

In the latter part of 1917 Dr. Cheatham began to notice a certain recurring weakness of the heart. Early in the present year the attacks became more serious, and, in the afternoon of April 3, 1919, the doctor left his office, walked into the corridor of St. Joseph's infirmary, and said to the sisters who greeted him, "I have come over to die." Three hours later he had expired. Dr. Cheatham was survived by a daughter, Mrs. Joseph R. Baker, of Evanston, Ill., and a sister, Mrs. E. D. Borne, of Taylorsville.

Dr. Cheatham was a man of great nervous energy and a tireless worker. He was often said to have treated gratis more patients than probably any other doctor in Kentucky. It is further said of him that he secured a reduction in the price of optical goods for those for whom he had prescribed, and who could not afford to pay the full prices. His love for animals was very pronounced, and he had many pets. Among these were three little rat terriers, Chita, Minnie, and Cricky, which he himself would always feed and on which he lavished much attention and care. He used to say that they helped fill the void in his life caused by the loss of loved ones. He had also a number of parrakeets, which whistled and chattered in a cage in his reception hall.

As to further characteristics a friend has written: "He was a man fond of good reading, of the classics, and he had many beautifully bound works in which he took delight. A collection of Hogarth engravings also was one of his possessions in which he took much pride. His Chestnut street office and home was filled with a number of curios, some of great historical value. Many of them were Civil, Mexican and Revolutionary War relics. He had a number of foreign weapons, some of ancient date, many of which had been used by noted persons. Never did he fail to entertain a visitor or patient with some interesting things which he had picked up here or there on his travels or which had been given him by those who knew of his hobby. Some valuable cloisonne vases were among his collection." Yet another friend has written: "In his day the most distinguished eye, ear, nose and throat specialist of the Southern country, Dr. Cheatham was never too busy to attend a patient, nor was a patient ever too poor to command his most scrupulous service. He believed that the art he was born with and the science he acquired through years of faithful study belonged to mankind, and so he used it. . . . To the public, there was never a truer friend; to his patients, there was never a less sordid healer; to his friend, there was never a finer comrade than Dr. Cheatham. The light fades from his tired eyes to live forever in the recollection of those who loved him."

George Anderson Cubbison. A well known ophthalmologist of Erie, Penna. Born in 1863, he received the medical degree at the Western Pennsylvania Medical College, Pittsburgh, in 1897. He died at his home Dec. 21, 1918, after a short illness from pneumonia. He was a Knight Templar, a Shriner, a member of the Temple Band. He is survived by his widow and two sons.

Mitchell Mikkelsen. An ophthalmologist and oto-laryngologist of Wells, Minnesota. He was born in Dane County, Wis., July 27, 1850, son of Knute and Caroline (Erickson) Mikkelsen. At the age of 22, in 1872, he homesteaded 160 acres of land in South Dakota, where, on a number of occasions, he had serious difficulties with the Indians. Later he became a herder of the Texas cattle which were owned by the U. S. Indian Agency nearby, and, in this way, was enabled to save the money which gave him a medical education. In 1877 he graduated at the College of Physicians and Surgeons, at Keokuk, Iowa, and in 1884 at the College of Physicians and Surgeons of Chicago. For twenty-seven years he practiced at Wells. He married on Oct. 22, 1879, a Miss Ella Heffron. After her death he married Miss Mary Perrigode Runo, a lady of French extraction. She died about fifteen years ago. For the last few years Dr. Mikkelsen had been living in retirement and in very feeble health. He died Jan. 8, 1919, from pneumonia.

Ellsworth Hazen Noble. A homeopathic ophthalmologist and oto-laryngologist, of Elmira, New York, well known locally. Born in 1866, he graduated from the Columbia College of Pharmacy in 1886 and from the New York Homeopathic Medical College in 1890. For about twenty years he practiced in Elmira. He died at his home in Elmira March 6, 1919, from acute gastritis, and was survived by his widow, who, before her marriage to Dr. Noble, was Miss Florence Loughhead, of Elmira.

Samuel Leo Oren. A young ophthalmologist and oto-laryngologist of Lewistown, Ill., who gave much promise. He was born at Laporte, Ia., on Oct. 1, 1879. Having attended Upper Iowa University at Fayette, Ia., he entered the Barnes Medical College, at St. Louis, Mo., at a very early age, and there received his medical degree in 1899, being only twenty years old. Later he took a year's graduate course in the medical department of the Iowa State University, at Iowa City, Ia.

For a time he practiced at Davis, Ill., but removed to Lewistown on Jan. 1, 1903, where he formed a partnership with his father, Dr. S. A. Oren. He married, in 1904, Miss Helen A. Wise, of Davis, Ill. He received his commission as first lieutenant in the medical corps of the U. S. Army on Aug. 18, 1917, and embarked for overseas in July, 1918. He died on duty in France, Oct. 9, 1918, presumably of collapse following ambulatory typhoid fever, and was buried with military honors in an American graveyard at Clermont-Ferrand, France.

James Morrison Ray. A well known ophthalmologist of Louisville, Ky. He was born Aug. 10, 1860, at Bloomfield, Nelson Co., Ky., son of Isaac N. and Ruth (Bodine) Ray, and nephew of the celebrated Dr. James M. Bodine. He received the medical degree at the University of Louisville in 1882, and, after a brief period of general practice, went to New York, where he studied the eye, ear, nose and throat in the Manhattan Eye and Ear Hospital. While in this institution he was assistant to the famous Dr. Cornelius Rea Agnew.

Returning to Louisville in 1885, Dr. Ray settled in that city as ophthalmologist and oto-laryngologist, and was immediately afterward appointed a clinical assistant in ophthalmology, otology, and laryngology in the Medical Department of the University of Louisville. He afterwards studied the eye, ear, nose and throat in Paris, London, and Vienna, and, returning to Louisville, was awarded the full professorship of opththalmology in his alma mater. When the various Louisville schools merged with the Medical Department of the University, Dr. Ray was elected chairman of the medical faculty, a position which he held till his death. He was ophthalmic surgeon to the Louisville City and to the SS. Mary and Elizabeth Hospitals, a member of the American Ophthalmological Society, a delegate to the International Medical Congress at London in 1913, and a Fellow of the American College of Surgeons. He was a Baptist.

Dr. Ray never married. He died in Louisville, Oct. 11, 1918, of chronic Bright's disease, survived by only two near relatives, sisters—Mrs. Sam Fulton, of Florida, and Mrs. Kate Wilson, of Louisville.

Dr. Ray was a large, stout man, of a fair complexion, and with gray eyes and brown hair. He wore as a rule a mustache. Concerning his mental characteristics a friend has written as follows: "It was said of him that his assiduity to and love for his profession served as an inspiration to the younger generation of physicians in Louisville. A gruffness of manner, which, however, was only a cloak which concealed a generosity of heart unequalled in Louisville. This, it was said, was the outstanding feature of his unique personality. Even to those he loved most, this characteristic was most apparent, and it was something which those who met him casually never failed to remark. This trait of gruffness concealing over-generosity, as it was characterized, was something to which hundreds of persons to whom he had given the best of his skill in the alleviation of disease and suffering might testify. Many of these never received a bill from him. Others, it is said, were made everlastingly grateful by a modest charge from an unusually able specialist.

Richard Andrews Reeve was a prominent Canadian ophthalmologist. Born in Toronto in 1842, son of William R. Reeve, he received the degree of B. A. at Toronto University in 1862, winning the silver medal in Natural Sciences. In 1865 he received the M. D. at Queen's University, Kingston, and, again, in 1889, at the University of Toronto. He became a Fellow of the Royal College of Physicians and Surgeons in 1866.

From 1865 until his death he seems to have practiced continuously in Toronto, excepting when engaged in study for the *ad eundem* degree. In 1867 he began to devote his attention exclusively to diseases of the eye and ear.

For many years he lectured on ophthalmology in the Toronto School of Medicine, and, from 1885 until his death, on ophthalmology and otology in the University of Toronto. In 1890 he was chosen dean of the medical faculty, a position which he resigned in 1908. He was made chief of the eye department in the Toronto General Hospital in 1907. He was also, for a time, a member of the Toronto University Council and of the Board of Regents of Victoria University.

Dr. Reeve was once president of the Canadian Medical Association, and was president of the British Medical Association when it met at Toronto in 1906. He was a delegate to the British Medical Congress in 1910 and from 1904-7 president of the University Alumni Association. He was also a Fellow of the American College of Surgeons.

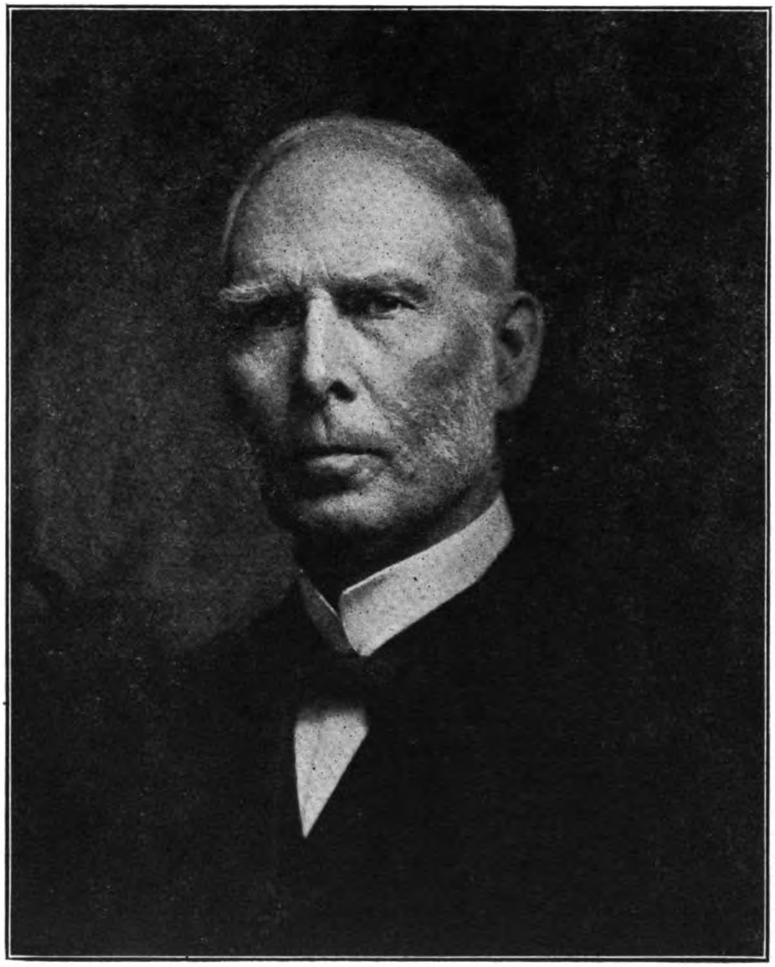
Dr. Reeve died suddenly on Jan. 27, 1919, at Harbord Street and Spadina Avenue, Toronto. He was an active member of the Central Methodist Church. Mrs. Reeve had died about two years before, and the only surviving relatives are two sisters and a brother, Dr. J. Reeve, of Deland, Florida.

Concerning the personality of Dr. Reeve, a writer in "The Canada Lancet" gives us the following: "His was one of those quiet, subtle influences that took a hold of one; and once it laid hold, grew. No one ever heard a rude or coarse remark fall from his lips. He was most deferential to the opinions of others, ever seeking to promote the welfare of his profession, always ready to act in any capacity, his confrères sought his aid, and always displaying a keen insight into the questions brought before him. His humor, too, was of the most delightful character . . . Dr. Reeve was both an example and an inspiration. He belongs to the future as well as the past."

Abraham Sachs. An eye, ear, nose and throat specialist of San Antonio, Texas. Born in Austria, Mar. 1, 1872, he received his medical degree at the Miami Medical College, Cincinnati, in 1900. At first he practiced in Cincinnati, then in Chicago, but at length, in 1906, removed to San Antonio. He was a brother of Harry Millard Sachs, a noted actor. He was asphyxiated at his residence on the evening of Jan. 19, 1919, by gas fumes in his bath room.

Charles Henry Weintz. An ophthalmologist of Cincinnati, O. Born in 1870, he received the medical degree at the Miami Medical College, Cincinnati, in 1909. He was assistant to the chief of the nose and throat department of the base hospital at Chillicothe, O., under Dr. C. R. Holmes. Dr. Weintz died at Camp Sherman, Oct. 14, 1918, of pneumonia.

Cornelius Williams. A well known ophthalmologist of St. Paul, Minn. Born in Kentucky in 1848, he removed in 1864 to Minnesota but later returned to Kentucky. His medical degree was received at the College of Physicians and Surgeons in the City of New York in 1874. Having studied ophthalmol-



Richard Andrews Reeve, 1842-1919.

ogy and oto-laryngology and practiced both these specialties in New York City for a number of years, he removed in 1882 to St. Paul. In 1901 he was president of the Ramsey County Medical Society. At some time in his career he was admitted to the Minnesota bar, and, on a number of occasions, conducted his own lawsuits—each time, it is said, successfully. He died at St. Luke's Hospital, St. Paul, Dec. 30, 1918, aged 70 years. He was survived by one son.

JESSE SYDNEY WYLER. A celebrated ophthalmologist of Cincinnati, O., who died young, but who had given much promise of great things. He was born at Cincinnati, Sept. 7, 1879, son of Isaac A. and Adelaide (Lowman) Wyler. His medical degree was received at the Miami Medical College in 1904. After serving as interne in the old City Hospital, he continued his studies in Europe. Returning to Cincinnati, he soon was widely known as a skilful operator. He was elected to the staff of the Cincinnati General Hospital in 1910 and to the staff of the Jewish Hospital in 1912.

Dr. Wyler was of medium height, smooth-faced, of a ruddy complexion and with bright brown eyes and hair. He was gay and genial, very fond of children, a collector of books, a Republican, not a religionist but a Jew by birth. He married, Nov. 30, 1908, Miss Florence Iglauer, by whom he had two children. He died at Cincinnati, Oct. 28, 1918.

Concerning the personality of this very able man, we are glad to quote the following from Dr. Derrick T. Vail, who knew him intimately: "Dr. Wyler was one of those enthusiastic, active, able and gifted men who studied ophthalmology not of necessity, for he came from a family possessing ample means, but because he was ambitious and had a natural desire for a scientific and professional career. He did not, therefore, declare himself an ophthalmologist or begin practicing before he was properly equipped.

"He possesed a fine education, spoke the German and French languages fluently, also had a reading knowledge of Spanish and Italian. He was actively connected with the American Journal of Ophthalmology on the staff of collaborators. Dr. Wyler enjoyed the high esteem of a wide circle of friends both in the profession and out of it. His mind was overflowing with information for he was a keen observer, a good student and had strong convictions for or against the many ophthalmological problems. He was fond of an argument and always believed he was right but was never obnoxious in his manner. He was a very skilful operator. His methods were largely of the Viennese school.

"He was of medium height and since he was approaching forty was beginning to show some of the increased heft of body. He had a high forehead, a strongly intellectual countenance, a winning smile and an ingratiating manner which distinguished him.

"His prewar admiration for the Vienna and Berlin schools of ophthalmology was very great. After our country became involved in the war, however, Dr. Wyler's patriotism and loyalty to our country were very keen and genuine. President Dabney of the University of Cincinnati has testified he died in the service of our country.

"He had a very large and select practice, which however did not in the least prevent his giving full time to his hospital clinic which he thoroughly enjoyed. He was very kind and liberal to the poor, and would give them his best time and services without stint. He was just rounding into the climax of a glorious career when stricken with pneumonia following influenza."

[NOTE.—Dr. Charles O. Zahn, noticed in this department in the February number, as we have been informed, was not an ophthalmologist.]

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C. Volunteers are needed in other localities.

DEATHS.

Emmet V. Ball, of Atlanta, Ga., of heart disease, aged 48 years.

Edward W. Dean, of Pittsburgh, Pa., of pneumonia, aged 69 years.

Mortimer Frank, of Chicago, of cerebral hemorrhage, aged 44 years.

The death is announced of Sir James MacKenzie Davidson, the pioneer of applied radiology in its relation to ophtholmology, at the age of 63. He was at one time ophthalmic surgeon to the Royal Infirmary of Aberdeen. Later, in London he invented the precise method of localization of foreign bodies in the orbit, by means of the X-ray.

The recent death of Dr. A. J. Stewart, of Provo, Utah, is announced; age 46.

PERSONALS.

Dr. Duverger, Ophthalmologist to the Limoges Hospital, France, and professor in the School of Medicine, is assigned to take charge of the Ophthalmic Faculty at Strasbourg.

The editor of this page recently spent six weeks in California. Several things were indelibly impressed upon his memory. One was that the California oculists are a royal lot of fellows. Another was that California is a delightful place in which to spend a vacation, so fascinating that if April and May are fair samples of their climate, it will be only a matter of time until the state will be too small to hold the population.

Dr. Frank C. Parker, Norristown, Pa., has succeeded Dr. W. C. Posey in the position at the Wills Eye Hospital, Phila., formerly held by Dr. Posey.

COMING MEETINGS.

The Pacific Coast, Oto-Ophthalmic Society will meet at San Francisco, August 4-7.

The Colorado Congress will be held in Denver, August 4-5, and will include both ophthalmic and oto-laryngologic papers and discussions.

The American Academy of Ophthalmology and Oto-Laryngology, will meet at Cleveland, Ohio, Sept. 1-3.

The Oxford Ophthalmological Congress, Oxford, England, July 10-12.

MILITARY NOTES.

Lieut. Col. Nelson Miles Black of Milwaukee has received his discharge from the Army.

Dr. Frederick E. Woodruff of St. Louis has been discharged from the Service.

Dr. H. H. Stark has been discharged from the Medical Corps of the United States Army and has resumed his practice at El Paso, Texas.

Lieut.-Col. Gustavus I. Hogue, of Milwaukee, Wisconsin, writes from Paris, France, that he expects to return soon to America.

Lieut. Col. Sir James Barrett, in the British Service, has returned to his home in Melbourne, Australia.

Col. Walter R. Parker, who was in charge of the department on the Surgery of the Head, at Washington, during our entire period in the war, has been discharged from the Service and has resumed his practice in Detroit.

Dr. Harry Vanderbilt Wurdemann, Seattle, Washington, has been released from army service, as chief of the Eye, Ear, Nose and Throat Section of the Base Hospital, Camp Lewis, Washington, and has returned to civil practice.

Dr. J. W. Thompson, who has been connected with Evacuation Hospital Number 17, located at Vladivostok, Siberia, has returned to Pueblo, Colorado, where he will resume the practice of ophthalmology, in association with his brother, Dr. H. M. Thompson.

Dr. Chas. A. Bahn of New Orleans, Ophthalmologist with Base Hospital 24, Tulane University, is one of the few members of the Unit who are still in France. He has recently been made major and is detailed to the Army Educational Commission in Paris.

Capt. J. M. Shields has been discharged from the Service and will locate in Denver and confine his practice to ophthalmology. He was Ophthalmologist to Base Hospital Number 102, which was assigned to duty with the Italian Army.

Capt. C. E. G. Shannon, an associate of Dr. Howard Forde Hansell, Professor of Ophthalmology, Jefferson College of Philadelphia, received his discharge from Government Service April 28th, and has resumed his practice at 1633 Spruce street.

Lieut. Col. de Schweinitz of Philadelphia was returned from Government Service on April first and has resumed private practice at 1705 Walnut street. On April twelfth Dr. de Schweinitz received his commission as Colonel in the Medical Section of the Officers' Reserve Corps, U. S. A.

Surgeon General Merritte W. Ireland was the guest of honor at a reception given under the auspices of the Philadelphia Medical Club at the Bellevue-Stratford Hotel on Friday evening, April 18th, which was attended by five hundred medical men. The reception was preceded by a dinner at the Union League, given in honor of General Ireland by Dr. G. Oram Ring, President of the Club.

Casey A. Wood has been made a full Colonel but he takes the honor so gracefully that his friends still continue to call him "Casey" as of old. A recent visit to him at Palo Alto, California, found him buried in his literary work, but ready to lay it aside long enough to show us the beautiful country in which he is working. He knows the name of every tree, shrub, flower and bird in and about Palo Alto, and it was a rare pleasure to have him to point them out.

Major George F. Suker, until recently in charge of the Eye, Ear, Nose and Throat Service at the Walter Reed General Hospital has resumed private practice at 25 E. Washington, Chicago.

Lieut. W. E. Carson, formerly in charge of ophthalmology at the U. S. N. Hospital, Great Lakes, has been ordered to inactive duty.

Lieut. Col. J. M. Farrell, head of the Spanish-American War Veterans, has returned from France with Base Hospital No. 81.

Major Ira H. Dillon, Bucyrus, Ohio, formerly Chief of Section of Surgery of the Head, Camp Bowie, Texas, has been discharged from service.

SOCIETIES.

The Pacific Coast Oto-Ophthalmological Society will meet at San Francisco August 4, 6, 7. The headquarters will be at the St. Francis Hotel. Dr. Cullin F. Welty is president and Dr. A. S. Green, secretary. A very interesting program has been prepared and a good time generally is predicted.

Dr. Samuel D. Risley has been invited by the special section of the Ohio State Medical Society to present the address in Ophthalmology at the meeting of the section, occurring May 6th, 7th and 8th, at Columbus, Ohio. Dr. Risley will be the guest of honor at a dinner given by Dr. John Edw. Brown at the Columbus Club, during his visit to the Middle West.

On May 15th last the Buffalo Ophthalmological Club had its last meeting during the season. After a subscription dinner, Dr. J. G. Dwyer, the guest of honor, gave a paper under the title, "The Relative Importance of the Teeth, Tonsils and Intestinal Tract in the Production of Focal Infections of the Eye with Especial Reference to the Intestinal Tract." It seems that Dr. Dwyer has made a step forward in elucidating many hitherto very obscure ocular conditions which baffled our therapeutists. The members present, twenty-five, including some out-of-town guests, enjoyed the presentation very much, and a lively discussion showed their interest.

At an interesting program of the Eye, Ear, Nose and Throat Section of the Illinois State Medical Society, which met at Peoria, May 20-22, papers were read by Dr. Willis O. Nance, of Chicago, on "Serpiginous Ulcer of the Cornea"; Dr. H. H. Brown, on "Various Types of Myopia"; Dr. A. L. Adams, Jacksonville, on "The Illinois Institution for the Blind"; Dr. H. W. Woodruff, Joliet, on "Glaucoma"; Dr. John R. Hoffman, on "Binocular Cataract Operations"; Dr. P. C. Matheny, Galesburg, on "Is Malaria an Etiologic Factor in Iritis"; Dr. Alfred N. Murray, Chicago, on "Iritis"; Dr. T. Faith, Chicago, "Early Extraction of Traumatic Cataracts"; Dr. E. R. Crossley, Chicago, "Eye Involvements Following Focal Infections"; Dr. E. E. Edmondson, Mt. Vernon, "Radium in Eye, Ear, Nose and Throat Diseases."

MISCELLANEOUS.

An interesting account of his ophthalmological service in the British army is given by Derby. He found among the alien labor companies that among several thousand Egyptians, nineteen per cent had trachoma; and in upwards of 100,000 Chinese, nine per cent were similarly affected.

After an interval of three years the examination for the Diploma in Ophthalmology at Oxford is to be resumed. The examiners appointed for this year are Dr. G. Mackay of Edinburgh, and Lieut.-Col. A. H. Elliot of London.

Because of their superior sense of touch, Fred F. Bulotin and his wife, both blind, were sworn in yesterday as civilian aids at the Fort Sheridan hospital. Their work will be to massage wounded soldiers. This is the first time in the history of medical reconstruction blind persons have been employed in army hospitals.

The management of the Archives d'Ophtalmologie announces that for the year 1919 the journal will be issued only bi-monthly; but in 1920 they will resume their monthly publication.

The last News Letter published by the National Committee for the Prevention of Blindness shows a widespread interest in the passage of laws by many states for the prevention of ophthalmia neonatorum and trachoma. Several states have Commissions for the Blind which are doing excellent work. The Field Secretary of the National Committee is out on an educational campaign to see that the laggard states are brought into line in these modern methods of ocular prophylaxis.

OPHTHALMIC LITERATURE

These lists contain the titles of all papers bearing on Ophthalmology received within the preceeding month. These titles are all in English, some of them modified to indicate more clearly their subjects. These subjects are grouped under appropriate heads, the succession of groups being the same from month to month. In the group the papers are arranged alphabetically usually by the name of the author in heavy-face type. After the subject of the paper (Ill.) indicates the number of illustrations. (Pl.) the number of plates, and (Col. pl.) colored plates illustrating the article. (Abst.) shows that it is an abstract of the original article. (Bibl.) tells that the paper is accompanied by an important bibliography. (Dis.) means that a discussion of the subject is published with it. Under Repeated Titles are indicated additional publication of papers already noticed. To secure the earliest possible notice writers may send copies of their papers, or reprints, to 318 Majestic Bldg., Denver, Colorado.

DIAGNOSIS.

Bartok, E. Simulation of Unilateral Blindness or Weak Sight? Zeit. f. Augenh., v. 35, pp. 44-46.

Birch-Hirschfeld, A. Method of Determining Visual Acuity in Simulation and Exaggeration. Zeit. f. Augenh., v. 37, pp. 289-293.

Blondel. Produced Diplopia in Diagnosis. Ann. d'Ocul., v. 156, p. 180.

Goldmann, R. Caloric Irritation of Ear a Means of Detecting Simulated Blindness. Zeit. f. Augenh., v. 37, pp. 77-82.

May, C. H. Electric Ophthalmoscope Mirror. Amer. Jour. Ophth., v. 2, p. 367.

Photometry. Brit. Jour. Ophth., v. 3, p. 207.

Von der Heydt, R. Fundus Pathology with Red-Free Light of Vogt. (4 ill.) Amer. Jour. Ophth., v. 2, pp. 334-336, and 351.

Repeated Titles. **Rasquin.** (v. 1, p. 540) Amer. Jour. Ophth., v. 2, p. 293.

THERAPEUTICS.

Bach, H. Light Management of Eye Diseases. Zeit. f. Augenh., v. 37, p. 244-246.

McIlroy, J. H. Methylene Blue in Purulent Discharge from Eye Socket. Brit. Med. Jour., April 5th, 1919, p. 405. Abst. Jour. A. M. A., v. 72, p. 1396.

Schanz, F. Bach's Light Therapy. Zeit. f. Augenh., v. 37, p. 246.

Repeated Titles. **Frias Onate.** (v. 2, p. 171) Amer. Jour. Ophth., v. 2, p. 293.

OPERATIONS.

Gwathmey, J. T., and Karsner, H. T. General Analgesia by Oral Administration. Abst. Brit. Jour. Ophth., v. 3, p. 214.

Löwenstein, A. Tongue-Shaped Flap with Interrupted Suture to Relieve Tension, after Kuhnt's Operation. (2 ill.) Zeit. f. Augenh., v. 38, pp. 191-192.

Pichler, A. Delicate Suture for Epithelial Stitch. Zeit. f. Augenh., v. 38, p. 202.

Seidel, E. Local Anesthesia or Nerve Conduction Anesthesia. (Bibl.) Zeit. f. Augenh., v. 35, pp. 87-93.

Ziegler, S. L. V-Shaped Iridotomy. Amer. Jour. Ophth., v. 2, p. 290.

Repeated Titles. **Macphail.** (v. 1, p. 811) Amer. Jour. Ophth., v. 2, p. 361.

REFRACTION.

Descola. Myopia. Ann. d'Ocul., v. 156, pp. 166-180.

Ergglet, H. Anisometropia; Experimental Observations. (9 ill.) Zeit. f. Sinnesphys, v. 49, p. 326. Abst. Klin. M. f. Augenh., v. 57, p. 406.

Espino, J. M. Cycloplegia after Diphtheria. Rev. Cubana de Oft., v. 1, p. 71.

Gardiner, E. J. An Old Time Victim of Ametropia and a Modern Instance. Jour. Amer. Med. Assn., v. 72, p. 1439.

Henker, O. Accurate Measurement of Eye Glasses and Mountings. (2 ill.) Zeit. f. Augenh., v. 38, pp. 212-220.

Howard, J. R. New Form of Bifocal Lens. Brit. Jour. Ophth., v. 3, p. 236.

Koster, W. Congenital, Buphthalmic, and Cyclitic Myopia. Zeit. f. Augenh., v. 35, pp. 12-26.

Levinsohn, G. Myopia. Zeit. f. Augenh., v. 35, pp. 243-248.

Lüdemann, A. Hydrodiascope or Contact Glass for Correction of Keratoconus. Zeit. f. Augenh., v. 37, pp. 267-289.

Newcomb, J. R. Refraction Methods in Department of Ophthalmology, Attending Surgeon's Office, Washington, D. C. (9 ill.) Amer. Jour. Ophth., v. 2, pp. 326-334.

Percival, A. S. Altered Effect of Spheric Lens When Rotated About its Horizontal Meridian. Brit. Jour. Ophth., v. 3, p. 237.

Pichler, A. Correction of Weak Myopia with Red Plane Glass. Zeit. f. Augenh., v. 38, pp. 174-176.

Rohr, M. v. Glasses for Astigmatic Eyes. (1 ill.) Klin. M. f. Augenh., v. 57, pp. 529-532.

Rönne, H. Keratoconus and Excessive Myopia. (1 ill.) Klin. M. f. Augenh., v. 57, pp. 512-517.

Wolff, H. Simplified Skiascopy. (393 Observations.) (1 ill., 4 pl.) Zeit. f. Augenh., v. 38, pp. 318-359.

OCULAR MOVEMENTS.

Argañaraz, B. Cerebral Nystagmus. Prensa Med. Arg., v. 5, p. 235. Abst. Jour. A. M. A., v. 72, p. 1261.

Berg, F. Latent Nystagmus. (1 ill., Bibl.) Zeit. f. Augenh., v. 38, pp. 164-174.

Brückner, A. Recognition of Voluntary Nystagmus. (Bibl.) Zeit. f. Augenh., v. 37, pp. 184-193.

Catlin. Operation for Strabismus. Amer. Jour. Ophth., v. 2, p. 289.

Fernandez, F. M. Treatment of Strabismus by Reese Operation. Rev. Cubana de Oft., v. 1, pp. 104-107.

Kleefeld, G. Myectomy with Suture in Correction of Strabismus. (5 ill.) Ann. d'Ocul., v. 156, pp. 145-150.

Hess, W. R. Method of Testing Motility of Eye. (9 ill.) Zeit. f. Augenh., v. 35, pp. 202-219.

Hill, C. E. Convergence Insufficiency as it Affects the Returned Soldier. Amer. Jour. Ophth., v. 2, pp. 338-340.

Ohm, J. Ear Labyrinth as Productive of Squint. (37 ill., Bibl.) Zeit. f. Augenh., v. 36, pp. 253-273.

Influence of Binocular Vision on Nystagmus. (20 ill.) Zeit. f. Augenh., v. 38, pp. 269-287.

Miners' Nystagmus and Accidents. Zeit. f. Augenh., v. 35, pp. 265-291.

Spiller, W. G. Oculogyration and Lesion Causing Complete Bilateral Ophthalmoplegia. Amer. Jour. Med. Sc., v. 157, pp. 695-699.

Suffa, G. A. Convergence and Convergence Insufficiency. Jour. Amer. Institute Homeop., v. 11, pp. 1269-1273.

Witmer, J. Head Shaking and Nystagmus. (2 ill., Bibl.) Klin. M. f. Augenh., v. 57, p. 361.

CONJUNCTIVA.

Bayer, H. Eruptions on Conjunctiva in Bulbar Tuberculosis. (6 ill.) Klin. M. f. Augenh., v. 57, pp. 564-582.

Blackburn, W. J. Trachoma, Report of Case. Jour. Amer. Inst. Homeop., v. 11, pp. 1163-1168.

Clapp, C. A. Pemphigus of Conjunctiva. Amer. Jour. Ophth., v. 2, p. 289.

Fernandez, F. M. Bilateral Subconjunctival Hemorrhage. Rev. Cubana de Oft., v. 1, p. 100. Amer. Jour. Ophth., v. 2, p. 340.

Fight Against Trachoma. Jour. Amer. Med. Assn., v. 72, p. 1475.

Gonzaga, L. School Trachoma. Brazil Med. Rio de Jan., v. 32, p. 366.

Griscom, J. M. Conjunctival Scars from Congenital Lues. (Dis.) Amer. Jour. Ophth., v. 2, p. 290.

Hesse, R. Application of Animal Charcoal in Treatment of Ophthalmogonoblennorrhea. Zeit. f. Augenh., v. 37, pp. 311-318.

Hühn, K. Fever and Milk Injections in Trachoma and Ophthalmogonorrhea. Zeit. f. Augenh., v. 36, pp. 305-310.

Livingstone, F. M. F. Colloidal Manganese in Gonorrheal Ophthalmia. Brit. Med. Jour., April 5th, 1919, p. 404.

Loeb, K. Adult Blennorrhea in Heidelberg University Eye Clinic, 1910-1917. Heidelberg Thesis, 1918.

Löwenstein, A. Etiology of Trachoma. Med. Klin., 1918, p. 1129.

McCord, C. P. Infection Through Conjunctiva? Amer. Jour. Ophth., v. 2, p. 368.

Pascheff, C. Peculiar Conjunctival Inflammation. (1 ill., Bibl.) Zeit. f. Augenh., v. 35, pp. 299-304.

Inflammation of Conjunctiva (Necrotic Infectious Conjunctivitis). (11 ill., Bibl.) Klin. M. f. Augenh., v. 57, pp. 517-529.

Patterson, J. A. Tuberculosis of Conjunctiva. (Dis.) Amer. Jour. Ophth., v. 2, p. 343.

Penichet, J. M. Trachoma in Cuba. Rev. Cubana de Oft., v. 1, p. 79.

Reporting Inflammation in Babies' Eyes. Kentucky Med. Jour., v. 17, p. 198.

Samperi, G. Trachoma. Gazz. Internat. de Méd., v. 21, p. 296.

Santos Fernandez, J. Cure of Trachoma. Rev. Cubana de Oft., v. 1, pp. 42-47.

Persistence of Some Varieties of Conjunctivitis. Arch. de Oft. Hisp.-Amer., v. 19, pp. 114-118.

Stargardt. Phthiriasis of Lids with Follicular Catarrh. Zeit. f. Augenh., v. 38, pp. 288-295.

Waldmann, B. Adult Ophthalmoblennorrhea in the Army. Zeit. f. Augenh., v. 38, pp. 177-185.

Wallace, F. E. Obscure Ocular Infection in Infant. Amer. Jour. Ophth., v. 2, p. 347.

Repeated Titles. **Mohr.** (v. 3, p. 306) Ann. d'Ocul., v. 156, p. 123. **Musy** (v. 1, p. 541). Amer. Jour. Ophth., v. 2, p. 361. **Schevensteen** (v. 1, p. 78). Arch. of Ophth., v. 48, p. 191.

CORNEA AND SCLERA.

Bell, G. H. Keratitis Profunda Following Antityphoid Inoculation. (Bibl.) Arch. of Ophth., v. 48, p. 273.

Caspar, L. Subepithelial Opacities of Cornea after Wounds. (7 ill.) Klin. M. f. Augenh., v. 57, pp. 385-390.

Chance, B. Fatty Degeneration of Cornea. Amer. Jour. Ophth., v. 2, p. 291.

Chen Hung Hsün. Phlyctenular Keratoconjunctivitis in Chinese. (Bibl.) Klin. M. f. Augenh., v. 57, pp. 549-556.

Fleischer, B. Hemosiderin Ring in Keratoconus. Klin. M. f. Augenh., v. 57, pp. 353-361.

Ford, R. Pigmentation of Cornea. Amer. Jour. Ophth., v. 2, p. 341.

Guiral, R. Leucoma of Cornea. (2 ill.) Rev. Cubana de Oft., v. 1, pp. 120-122.

Heinen. New Corneal Reflex. Münch. med. Woch., 1916, No. 36, p. 1308. Abst. Klin. M. f. Augenh., v. 57, p. 408.

Hinneberg, O. K. W. Congenital Opacity of Cornea. (Bibl.) Klin. M. f. Augenh., v. 57, pp. 477-494.

Koeppe, L. Rodent Ulcer of Cornea Cured by Tuberculin. (3 ill., Bibl.) Zeit. f. Augenh., v. 38, pp. 301-318.

Kraupa, E. Development of Disease and Keratoconus. (Bibl.) Klin. M. f. Augenh., v. 57, pp. 109-125.

Kuhnt, H. Transplantation of Fascia Lata for Corneal Defect. Zeit. f. Augenh., v. 36, pp. 300-305.

Perrin, R. Keratitis Due to Melinite. Ann. d'Ocul., v. 156, pp. 160-166.

Pichler, A. Caspar's Ring Opacity of Cornea. Zeit. f. Augenh., v. 36, pp. 311-16.

Rönne, H. Etiology and Treatment of Keratomalacia. Klin. M. f. Augenh., v. 57, pp. 381-384.

Siegrist, A. Etiology of Keratoconus. Klin. M. f. Augenh., v. 57, pp. 350-353.

Strebel, J. Treatment of Corneal Herpes. Corresp.-Bl. f. Schweiz. Aerzte, 1918, No. 39. Abst. Ann. d'Ocul., v. 156, p. 181.

Nerves of the Cornea. Corresp.-Bl. f. Schweiz. Aerzte, 1918, No. 43. Abst. Ann. d'Ocul., v. 156, p. 182.

Uribe-Troncoso, M. Acne Rosacea Complicated by Fascicular Keratitis. Rev. Cubana de Oft., v. 1, pp. 63-65.

Weill, G. Correction of Keratoconus thru Prothesis. Klin. M. f. Augenh., v. 57, pp. 126-128.

ANTERIOR CHAMBER AND PUPIL.

Bachstez, E. Unilateral Loss of Pupil Reflex. Zeit. f. Augenh., v. 35, pp. 304-311.

Espino, J. M. Pupillary Reflexes. (Bibl.) Rev. Cubana de Oft., v. 1, pp. 65-71.

Gonzalez, J. Three Supernumerary Pupils. Med. Ibera., v. 6, p. 210. Abst., Jour. Amer. Med. Assn., v. 72, p. 1581.

Harlan, H. Operation for Closed Pupil. Amer. Jour. Ophth., v. 2, p. 288.

Landolt, M. Uneven Pupils after Trephining. Ann. de Méd., v. 5, p. 566.

Sergent, E. Inequality of Pupils in Syphilis. Bull. de l'Acad. de Méd., v. 81, p. 284. Abst., Jour. Amer. Med. Assn., v. 72, p. 1497.

Wiegemann, E. Persistent Pupillary Membrane. Klin. M. f. Augenh., v. 57, pp. 508-512.

Repeated Titles. **Fromaget, C. & H.** (v. 1, p. 879) Amer. Jour. Ophth., v. 2, p. 356. **Raeder** (v. 1, p. 813) Amer. Jour. Ophth., v. 2, p. 292.

UVEAL TRACT.

Baumeister, T. Postoperative Cyclitis. (Bibl.) Klin. M. f. Augenh., v. 57, pp. 532-548.

Cutler, C. W. Conglomerate Tubercle of Choroid. (Dis.) Arch. of Ophth., v. 48, pp. 300-303.

Folman, M. Etiology of Rheumatic Iritis. Deutsche med. Woch., v. 45, p. 75. Abst., Jour. Amer. Med. Assn., v. 72, p. 1499.

Gilbert, W. Rheumatic and Metastatic Iritis. Zeit. f. Augenh., v. 37, pp. 174-183.

Heed, C. Metastatic Uveitis. Amer. Jour. Ophth., v. 2, p. 289.

Ischreyt, G. Coloboma of Iris and Choroid. (1 ill.) Klin. M. f. Augenh., v. 57, pp. 494-499.

Krauss. Disseminated Unilateral Choroiditis. Amer. Jour. Ophth., v. 2, p. 350.

Leiche, T. I. Iritis due to Third Molar Impaction. Amer. Jour. Surg., v. 33, p. 119.

Lundsgaard, K. K. K. Cyclitis in Epidemic Parotitis. Klin. M. f. Augenh., v. 57, pp. 393-395.

Magruder, A. C. Iritis from Antrum Infection. (Dis.) Amer. Jour. Ophth., v. 2, pp. 347-348.

SYMPATHETIC DISEASE.

Bierhaus, D. Tuberculosis and Sympathetic Ophthalmia. Rostock Diss.

Brückner. Emigration of Blood Cells and Sympathetic Inflammation without Sympathetic Ophthalmia. (8 ill., Bibl.) Zeit. f. Augenh., v. 38, pp. 139-151.

Dimmer, F. War Wounds and Sympathetic Ophthalmia. Klin. M. f. Augenh., v. 57, pp. 257-272. Abst., Amer. Jour. Ophth., v. 2, p. 294.

Moore, F. Sympathetic Ophthalmitis. Amer. Jour. Ophth., v. 2, p. 288.

Schevensteen, v. Sympathetic Ophthalmia. Arch. Méd. Belg., v. 72, p. 621. Abst., Jour. Amer. Med. Assn., v. 72, p. 1256.

Stargardt, K. Unusual Sympathetic Ophthalmia with War Injury. Zeit. f. Augenh., v. 39, pp. 12-20.

GLAUCOMA.

Deutschmann, R. Traumatic Glaucoma. Zeit. f. Augenh., v. 37, pp. 318-324; v. 38, pp. 209-211.

Gunnufsen, Th. Operative Management of Primary Glaucoma. (6 ill., Bibl.) Klin. M. f. Augenh., v. 57, pp. 283-349.

Harlan, H. Buphthalmos. Amer. Jour. Ophth., v. 2, p. 288.

Pava, C. M. Glaucoma. Rep. de Med. y Cirurg., v. 10, p. 245.

Peters, A. Traumatic Glaucoma. Zeit. f. Augenh., v. 38, pp. 202-209.

Schipfer, L. A. Glaucoma with Influenza. Amer. Jour. Ophth., v. 2, p. 368.

Schoute, G. J. Fields of Vision and Choice of Operation in Glaucoma. (1 ill.) Zeit. f. Augenh., v. 35, pp. 291-299.

Tiberio Rojas, A. Glaucoma. Rep. de Med. y Cirurg. Bogata, v. 10, p. 77.

Uribe-Troncoso, M. Lessons from Scleral Trephining. Amer. Jour. Ophth., v. 2, pp. 362-363.

Repeated Titles. **Alonzo.** (v. 2, p. 231) Amer. Jour. Ophth., v. 2, p. 296.

CRYSTALLINE LENS.

Fernandez, F. M. Operation of Unilateral Cataract. (Bibl.) Rev. Cubana de Oft., v. 1, pp. 95-98.

Gonzalez, J. de J. Spontaneous Resorption of Cataract. Rev. Cubana de Oft., v. 1, pp. 73-79.

Guiral, R. Indian Operation for Cataract. Rev. Cubana de Oft., v. 1, pp. 122-126.

Hess. Arcus Senilis, Virilis and Juvenilis. München. med. Woch., v. 65, p. 1169.

Ischreyt, G. Coloboma of Lens. Klin. M. f. Augenh., v. 57, pp. 503-507.

Jano, A. v. Posterior Lenticonus. (1 ill., Bibl.) Zeit. f. Augenh., v. 38, pp. 192-197.

Knapp, A. Bilateral Subluxation of Lenses with Fundus Changes. (Dis.) Arch. of Ophth., v. 48, pp. 284-286.

Neeper, E. R. Radiating Lens Opacities. (Dis.) Amer. Jour. Ophth., v. 2, p. 344.

Cataract with Doubtful Light Projection. (Dis.) Amer. Jour. Ophth., v. 2, p. 345.

Cataract Extraction. Poor Vision Unexplained. (Dis.) Amer. Jour. Ophth., v. 2, p. 345.

Santos Fernandez, J. Operation for Traumatic and Congenital Cataract in the Young. Rev. Cubana de Oftal., v. 1, pp. 25-29.

Judgment in the Operation of Cataract. (Bibl.) Rev. Cubana de Oftal., v. 1, pp. 30-36.

Schlichter, C. H. Congenital Dislocation of Both Lenses, very Poor Vision. Arch. of Ophth., v. 48, p. 294.

Terson, A. Preliminary Iridectomy in Extraction of Diabetic Cataract. Ann. d'Ocul., v. 156, pp. 133-143.

Vogt, A. Lens in Cases of Pupillary and Anterior Exudation, also Luxation of Lens. Klin. M. f. Augenh., v. 57, pp. 395-397.

Wootton, H. W. Unusual Secondary Cataract Following Extraction of a Dislocated Lens. Arch. of Ophth., v. 48, p. 286.

Zentmayer, W. Spontaneous Rupture of the Anterior Lens Capsule with Rapid Development of Cataract. (Dis.) Amer. Jour. Ophth., v. 2, pp. 348-349.

VITREOUS.

Curran, E. J. Clinical Significance of Hyaloid Reflexes. Jour. Kansas Med. Soc., v. 19, pp. 15-17.

Ziegler, S. L. Adventitious Hyaloid Membrane. Amer. Jour. Ophth., v. 2, pp. 350-351.

RETINA.

Agatston, S. A. Retinitis Punctata Albescens. (Dis.) Arch. of Ophth., v. 48, p. 294.

Augstein, C. War Experience with Hemeralopia and Background of the Eye. (1 ill., 2 pl.) Klin. M. f. Augenh., v. 57, pp. 272-283.

Batton, R. Macular Disease. Amer. Jour. Ophth., v. 2, p. 341.

Brewerton, E. Angoid Streaks in Retina. Amer. Jour. Ophth., v. 2, p. 340.

Ferree, C. E., and **Rand, G.** Chromatic Thresholds of Sensation from Center to Periphery and the Retina and Their Bearing on Color Theory. Psychol. Rev., 1919, v. 26, pp. 16-41.

Goldenburg, M. Embolism of Central Retinal Artery as a Complication of Influenza. Amer. Jour. Ophth., v. 2, p. 355.

Hegner, C. A. Exudative Retinitis with Lymphogranulomatosis. (2 col. pl., Bibl.) Klin. M. f. Augenh., v. 57, pp. 27-48.

Heverock. Megalopsia and Micropsia. Wien. med. Woch., v. 68, p. 1461.

Hudson, A. C. Retinal Changes Following Injury. (Dis.) Amer. Jour. Ophth., v. 2, p. 286.

Janney. Detachment of Retina. Amer. Jour. Ophth., v. 2, p. 289.

Krauss. Extensive Pigment Changes in the Retina Following Injury. (Dis.) Amer. Jour. Ophth., v. 2, pp. 349-350.

Krückmann, E. Marginal Neurogtia and Perivascular Lymph vessels of the Retinal Capillaries. (3 col. pl., Bibl.) Zeit. f. Augenh., v. 37, pp. 1-25.

Meyer, H. Apparatus for Determining Dark Adaptation for White and Colored Lights. (Bibl.) Zeit. f. Augenh., v. 37, pp. 198-211.

Three Hundred Cases of Hemeralopia. (3 tab. Bibl.) Zeit. f. Augenh., v. 39, pp. 48-76.

Oloff, H. Embolism of Central Retinal Artery. München. med. Woch., v. 65, pp. 1129-1131.

Peters, A. Painful Dazzling. Klin. M. f. Augenh., v. 57, pp. 556-564.

Rausch, R. Impaired Dark Adaptation in the Army. München. med. Woch., 1916, No. 43, p. 1521. Abst. Klin. M. f. Augenh., v. 57, 442.

Santos Fernandez, J. Extreme Photophobia. Rev. Cubana de Oftal., v. 1, pp. 48-57.

Schertlin, G. Retrochoroiditis (Jensen). (8 ill.) Klin. M. f. Augenh., v. 57, pp. 60-76.

Stargardt, K. Familial Progressive Degeneration in Region of Macula. (Bibl.) Zeit. f. Augenh., v. 35, pp. 249-255.

Stoewer, P. Retinal Detachment and Muscle Paralysis in Nephritis of Pregnancy. (1 tab.) Zeit. f. Augenh., v. 36, pp. 314-322.

TOXIC AMBLYOPIAS.

Birch-Hirschfeld, A. Intoxication Amblyopias. Zeit. f. Augenh., v. 35, pp. 1-12.

Uhthoff, W. Optochin Amblyopia. (7 ill.) Klin. M. f. Augenh., v. 57, pp. 14-27.

OPTIC NERVE.

Behr, C. Differential Diagnosis Between Choked Disc and Inflammation of Disc. (1 ill.) Klin. M. f. Augenh., v. 57, pp. 465-476.

Butler, T. H. Acute Retrobulbar Neuritis in Boy. Arch. of Ophth., v. 48, p. 240.

Campbell, H., and **Ballance, C.** Arrest of Tabetic Optic Atrophy by Introduction of Salvarsanized Serum in Lateral Ventricle. Lancet, April 12, 1919, p. 608.

Doesschate, G. ten. Formation of Connective Tissue in Optic Papilla. (1 ill., 3 col. pl.) Zeit. f. Augenh., v. 38, pp. 197-201.

Fleming. Neuroretinitis. Amer. Jour. Ophth., v. 2, p. 289.

Ischreyt, G. Coloboma of Optic Nerve. Klin. M. f. Augenh., v. 57, p. 501.

Magruder, A. C. Syphilitic Optic Atrophy. Amer. Jour. Ophth., v. 2, p. 348.

Mussio-Fournier, J. C. Blindness from Double Optic Neuritis with Hypothyroidism. Arch. de Oft. Hisp.-Amer., v. 19, p. 129. Abst. Jour. Amer. Med. Assn., v. 72, p. 1503.

Ocular Sensibility to Pressure and Changes in Tabes Dorsalis. Med. Record, v. 95, p. 787.

Taylor, J. Changes in Sella Turcica in Family Optic Atrophy. (3 ill.) Brit. Jour. Ophth., v. 3, pp. 193-197. Amer. Jour. Ophth., v. 2, p. 287.

VISUAL TRACTS AND CENTERS.

Doeschate, G. ten. Disturbance of Visual Fields in Aviators. (3 ill.) Zeit. f. Augenh., v. 39, pp. 30-36.

Ford, R. Tumor of Pituitary Body. Amer. Jour. Ophth., v. 2, p. 341.

Heine. Congenital Word Blindness. München. med. Woch., 1916. Abst., Klin. M. f. Augenh., v. 57, pp. 423-424.

Kirkpatrick, E. A. Hemianopsia. Med. Quart., 1919, v. 1, pp. 39-42.

Meyerhof, M. Incongruent Hemianopsia after Shot Wounds. (2 ill.) Klin. M. f. Augenh., v. 57, pp. 390-393.

Moreau, F. Psychic Blindness. Ann. d'Ocul., v. 156, pp. 156-160.

Ormond, A. W. Pituitary Tumors. Amer. Jour. Ophth., v. 2, pp. 341-342.

Pötzl, O. Hemianopsia. Wien. klin. Woch., No. 44, 1918, v. 31, p. 1183.

Rauschburg, P. Reading and Number Asthenia of School Children. Klin. M. f. Augenh., v. 57, pp. 408-410.

Reis. Acquired Function Following Traumatic Homonymous Hemianopsia. Zeit. f. Augenh., v. 36, pp. 273-299.

Schlivek, K. Tumor in the Pituitary Region. Arch. of Ophth., v. 48, pp. 289-290.

Villaret, M., and Beaulieu, F. Visual Field after Brain Wounds in Occipital Region. Ann. de Méd., v. 5, p. 556.

COLOR VISION.

Weill, G. Stilling's Isochromatic Chart for Testing Color Sense. Leipsig, 1918, Thieme. Berl. klin. Woch., 1918, v. 55, p. 648.

EYEBALL.

Alling, A. N. Fat Transplantation into Tenon's Capsule after Enucleation. Arch. of Ophth., v. 48, pp. 263-264.

Bourquin, J. Congenital Melanosis of the Eye. (2 pl., Bibl.) Zeit. f. Augenh., v. 37, pp. 129-179 and 294-311.

Duverger and Lapersonne. Advantages of Intrascleral Cartilage Graft after Enucleation of Eyeball. Bull. de l'Acad. de Méd., v. 81, p. 237.

Franke, E. Stump Formation after Enucleation. Zeit. f. Augenh., v. 35, pp. 46-47.

Gougelmann-Pierre. Substitutes for Excision of Eyeball from Standpoint of the Artificial Eye Maker. Arch. of Ophth., v. 48, pp. 268-272.

Howard, H. J. Implantation of a Glass Ball within Tenon's Capsule by Verhoeff's Method. Arch. of Ophth., v. 48, pp. 265-267.

Key, B. W. Fat Implantation. (Dis.) Arch. of Ophth., v. 48, pp. 292-293.

Knapp, A. Fat Implantation. Arch. of Ophth., v. 48, p. 293.

Liebermann, L. v. Technic of Orbital Local Anesthesia for Enucleation. Zeit. f. Augenh., v. 37, pp. 194-198.

Stargardt, K. Rare Deformity in the Eye. (Microphthalmos with Dermoid.) (1 pl., Bibl.) Zeit. f. Augenh., v. 37, pp. 25-42.

Sweet, W. M. Substitute Operations for Excision of Eyeball. Metal Ball in Tenon's Capsule. Arch. of Ophth., v. 48, pp. 257-262.

Weeks, J. E. Mules' Operation. Arch. of Ophth., v. 48, pp. 291-292.

LACRIMAL APPARATUS.

Escola Sabater, M. V. Technic of Extirpation of Lacrimal Sac. Rev. Cubana de Oft., v. 1, p. 90.

Fernandez, F. M. Blennorrhagic Dacryocystitis. Rev. Cubana de Oft., v. 1, p. 97.

Fischer, C. C. Treatment of Lacrimal Passage from Rhinologic Standpoint Consideration of Toti's Operation. (4 ill., Bibl.) Zeit. f. Augenh., v. 39, pp. 1-12.

Frieberg, T. Mechanics of Tear Flow and Newer Tear Sac Operations. (2 pl., Bibl.) Zeit. f. Augenh., v. 37, pp. 42-66; 211-243; and 324-366.

Gallemaerts. Fistula of Palpebral Lacrimal Gland. Ann. d'Ocul., v. 156, p. 127.

Halle. West's Operation on Tear Sac. Berl. klin. Woch., 1918, v. 55, p. 550.

Hegner, C. A. Occurrence of Agglutinins in Lacrimal Fluid. Klin. M. f. Augenh., v. 57, pp. 48-50.

Paterson, J. V., and Fraser, J. S. Intranasal Dacryocystotomy; Intranasal Drainage of Lacrimal Sac. (6 ill.) Brit. Jour. Ophth., v. 3, pp. 197-204.

Stoewer, P. Thrombophlebitis, Loss of Eye after Extirpation of Tear Sac. Zeit. f. Augenh., v. 36, p. 310.

West, J. M. 480 Intranasal Lacrimal Sac Operations in Cases of Dacryostenosis. (12 ill.) Zeit. f. Augenh., v. 35, pp. 219-243.

LIDS.

Bachstez, E. Congenital Fold Formation of Lid, Epiblepharon with and without Entropion. (2 ill., Bibl.) Klin. M. f. Augenh., v. 57, pp. 372-381.

Gonzalez Rincones, R. Ptosis after Extirpation of Tonsils with Local Novocain Anesthesia. Rev. Cubana de Oft., v. 1, p. 72.

Löwenstein, A. Emphysema of Lids and Orbit. Klin. M. f. Augenh., v. 57, pp. 77-81.

Plocher, R. Lid Gangrene from Pus Germs. (5 ill.) Klin. M. f. Augenh., v. 57, pp. 51-60.

Riegel, F. Plastic Operations on Lids. Würzburg Thesis.

ORBIT.

Fernandez, F. M. Optic Neuritis and Exophthalmos with Orbital Tumor. Rev. Cubana de Oft., v. 1, pp. 101-103.

Fritsch, H. Pulsating Exophthalmos. (Bibl.) Zeit. f. Augenh., v. 38, p. 186.

Good, R. H. Orbital Abscess. (Dis.) Amer. Jour. Ophth., v. 2, pp. 352-355.

Jickeli, C. Inflammatory Acute Exophthalmos. Klin. M. f. Augenh., v. 57, pp. 398-401.

McGregor, J. K. Exophthalmic Goiter. Canadian Med. Assn. Jour., v. 9, pp. 406-411.

Mollison, W. M. Injuries and Inflammatory Diseases Affecting Orbit and Sinuses. Roy. Soc. Med., April 10th, 1919. Abst. Lancet, April 26, 1919, p. 699.

Potter, F. M. Exophthalmic Goiter. Endocrinology, v. 2, p. 16.

Rados, A. Congenital Retraction of Globe. Berl. klin. Woch., v. 55, p. 1096.

Rondopoulo, P. G. Exophthalmos in Nephritis. Bull. de la Soc. de Méd., v. 43, p. 4. Abst. Jour. Amer. Med. Assn., v. 72, p. 1257.

Schulmann, E. Syphilitic Exophthalmic Goiter. 107 pages, Paris, 1919.

PARASITES.

Carsten, P. Subretinal Cysticercus. (4 col. pl., Bibl.) Zeit. f. Augenh., v. 38, pp. 296-301.

Forbes, J. G. Conjunctival Filaria in Man, with first Recorded Discovery of Male Worm. (8 ill., Bibl.) Lancet, April 19, 1919, p. 654.

Gallemaerts. Subconjunctival Cysticercus. Ann. d'Ocul., v. 156, p. 125.

TUMORS.

Avery, J. W. Melanosarcoma with Microscopic Slide. Arch. of Ophth., v. 48, p. 287.

Carruthers. Intraocular Tumor. Amer. Jour. Ophth., v. 2, p. 341.

Cunningham, J. F. Tumor of Orbit. Amer. Jour. Ophth., v. 2, p. 287.

Fuchs, E. Carcinoma of Limbus Extending to Choroid. (3 ill.) Klin. M. f. Augenh., v. 57, pp. 1-8.

Gallemaerts. Melanosarcoma of Lid. (1 ill.) Ann. d'Ocul., v. 156, p. 131. Melanosarcoma of Conjunctiva. (1 ill.) Ann. d'Ocul., v. 156, p. 129.

Gilbert, W. Syphilitic Lymphoma of Conjunctiva and Membrane Formation. (1 col. pl.) Zeit. f. Augenh., v. 38, pp. 152-155.

Girgis Abdel Messih. Epithelioma of Lid in Five-year Old Child. Ophth., Soc. of Egypt, 1917, p. 87. Abst. Brit. Jour. Ophth., v. 3, p. 225.

Grimsdale, H. Pulsating Tumor of Orbit. Amer. Jour. Ophth., v. 2, p. 341.

Hoeve, van der, J. Roentgen Diagnosis of Orbital Tumor. (6 ill.) Zeit. f. Augenh., v. 38, p. 156. Abst. Brit. Jour. Ophth., v. 3, p. 229.

Jeremy, H. R. Perithelioma of Orbit. Brit. Jour. Child. Dis., v. 15, p. 273.

Lawson, A. Recurrent Glioma of Retina. Proc. Roy. Soc. Med. Sec. on Ophth., Feb., 1917. Abst. Brit. Jour. Ophth., v. 3, p. 222.

Marin Amat, M. Melanosarcoma of Ciliary Region; Importance of Diagnosis. (3 ill.) Arch. de Oft. Hisp.-Amer., v. 19, pp. 118-128.

Mendelsohn, R. W. Melanotic Sarcoma of Choroid. (3 ill.) Jour. Amer. Med. Assn., v. 72, p. 1203.

Stern, H. Osteoma of Orbit. (8 ill., Bibl.) Zeit. f. Augenh., v. 35, p. 75.

Török, E. Sarcoma of Ciliary Body. Arch. of Ophth., v. 48, p. 294.

Uhthoff, W. Tuberculosis of Conjunctiva and Lids with Lymphangioma. (4 ill.) Klin. M. f. Augenh., v. 57, pp. 8-14.

Repeated Titles. **Berner** (v. 2, p. 232) Amer. Jour. Ophth., v. 2, p. 359. **Fuchs** (v. 1, p. 752) Brit. Jour. Ophth., v. 3, p. 225.

INJURIES.

Bab, W. Rupture of Choroid in War Injuries. Berlin Thesis.

Bohm, K. Injury to Eyes from Lead Splash. (15 ill.) Klin. M. f. Augenh., v. 57, pp. 82-109.

Butler, T. H. Surgery of Eyes after War Injuries. Birmingham Med. Rev., 1919, p. 478. Abst. Therap. Gaz., v. 43, p. 348.

Cords, R. Therapy of Orbital Foreign Bodies in War. (12 ill.) Zeit. f. Augenh., v. 35, pp. 26-43.

Foreign Body Extraction from Eyeball under Roentgen Rays. Zeit. f. Augenh., v. 37, pp. 67-77.

Eversheim, P. Simple Sideroscope with Presentation Free from Interruption. (2 ill.) Zeit. f. Augenh., v. 35, pp. 70-74.

Grout, G. H. Reparative Surgery after Ocular Injuries. (15 ill.) Arch. of Ophth., v. 48, pp. 227-239.

Gutmann. Paraplegia of Orbital Penetrating Wounds. Deut. med. Woch., 1916, No. 34. Abst. Klin. M. f. Augenh., v. 57, p. 432.

Hoeve, van der, J. Foreign Bodies in Eye. Zeit. f. Augenh., v. 39, pp. 20-30.

Ischreyt, G. Ocular Injuries. (Bibl.) Zeit. f. Augenh., v. 39, pp. 77-93.

Keyser, G. W. Electric Ophthalmia. Norsk Mag. for Laegeviden, v. 80, p. 275.

Lambert, W. E. Foreign Body in Globe. (Dis.) Arch. of Ophth., v. 48, p. 284.

Neeper, E. R. Penetrating Injuries. (Dis.) Amer. Jour. Ophth., v. 2, p. 346.

O'Brien, J. J. Foreign Bodies in Eyeball. Three Cases. Amer. Jour. Ophth., v. 2, p. 337.

Pilcher, A. Nonperforating Splinter Injuries. Zeit. f. Augenh., v. 39, p. 37.

Sherman, E. S. Extraordinary Case of Foreign Body in Eyeball. (Dis.) Arch. of Ophth., v. 48, p. 286.

Radcliffe, McC. Injury from Rat Poison. Amer. Jour. Ophth., v. 2, p. 290.

Ricchi, G. Traumatic Lesions of Macula. Policlin., v. 26, p. 60. Abst. Jour. Amer. Med. Assn., v. 72, p. 1260.

Schweinitz, G. E. de. Concerning Concussion and Contusion Injuries of Eye in Warfare. (Bibl.) Amer. Jour. Ophth., v. 2, pp. 313-318. Discussion, p. 284.

Tyson, H. H. Traumatic Aniridia Following Extraction with Haab Magnet, a Foreign Body in Lens. (Dis.) Arch. of Ophth., v. 48, p. 283.

Repeated Titles. **Frenkel** (v. 1, p. 543) Amer. Jour. Ophth., v. 2, p. 292.

PATHOLOGY.

Ohm, J. Abderhalden's Blood Experiments with Keratoconus, Glaucoma, Retinitis Pigmentosa and Miners' Nystagmus. Zeit. f. Augenh., v. 37, p. 82.

Versé. Blood and Eye Changes in Experimental Cholesteremia. Münch. med. Woch., 1916, No. 30, p. 1074. Abst. Klin. M. f. Augenh., v. 57, p. 456.

Wegeforth, P. Experimental Production of Panophthalmitis by Infection from Blood Stream. (6 ill., Bibl.) Arch. of Ophth., v. 48, p. 276.

GENERAL DISEASES.

Fernandez, F. M. Ocular Tuberculosis. Rev. Cubana de Oftal., v. 1, pp. 107-120.

Ferrannini, A. The Oculocardiac Reflex. Riforma Med., v. 35, p. 283. Abst. Jour. Amer. Med. Assn., v. 72, p. 1579.

Fisher, J. H. Migrain. (Dis.) Amer. Jour. Ophth., v. 2, p. 342.

Gallemaerts. Ophthalmic Zona in Five-year-old Child. (1 ill.) Ann. d'Ocul., v. 156, p. 128.

Good, W. H., and Ellis, A. G. Ocular Lesions in Myxedema. Endocrinology, v. 2, p. 431.

Gordon, A. Encephalitis Lethargica. New York Med. Jour., v. 109, p. 837.

Heitger, J. D. Vertigo; Its Relation to General Medicine. Amer. Jour. Surg., v. 33, p. 105.

Moreau, F. Alternating Pseudosyndrome. Ann. d'Ocul., v. 156, p. 151.

Odeneal, T. H. Close Relationship Existing between General Practitioner, Ophthalmologist and Oto-Laryngologist. Boston Med. and Surg. Jour., v. 180, p. 459.

Osborne, E. S. Ductless Glands in Relation to Eye. Amer. Physiol. Educat. Rev., v. 24, p. 164.

Picot, G. Oculocardiac Reflex. Presse Méd., v. 27, p. 191.

Rolleston, H. Ocular Signs and Symptoms in Cerebrospinal Fever. Lancet, April 12, 1919, p. 598.

Rosenbeck, C. Ocular Lesions in Myasthenia Gravis. (1 ill.) Jour. Amer. Med. Assn., v. 72, p. 1211.

Santos Fernandez, J. Peculiar Ocular Diseases in Cuba. Rev. Cubana de Oft., v. 1, p. 17.

Minor Ocular Affections from Disorders of Liver. Rev. Cubana de Oft., v. 1, pp. 22-25.

Stallings, T. W. Focal Infection and Diseases of Eye. Jour. Okla. State Med. Assn., v. 12, p. 111.

Strauss, I., Hirshfeld, D., and Loewe, L. Epidemic Encephalitis. New York Med. Jour., v. 109, p. 772.

Stevens, G. T. Chorea. Amer. Med., v. 14, pp. 207-10.

Tilney, F., and Riley, H. A. Epidemic Encephalitis. Neurol. Bull., March, 1919, p. 106.

Török, E. Tuberculin in Diagnosis and Treatment of Eye Diseases. Arch. of Ophth., v. 48, pp. 242 and 295.

Tucker, B. R. Epidemic Encephalitis Lethargica. Jour. Amer. Med. Assn., v. 72, pp. 1448-1450.

Voisin and Benhamon. Therapeutic Value of Oculocardiac Reflex. Paris Méd., v. 9, p. 210. Abst. Jour. Amer. Med. Assn., v. 72, p. 1333.

Ward, G. Headache and Eye Changes in Malaria and Trench Fever. Lancet, Apr. 12, 1919, p. 610.

HYGIENE.

Code of Lighting for Factories, Mills and other Work Places. Pub. Health Reports, v. 34, Jan. 24, 1919, pp. 103-123.

Metzger, I. D. Easy Vision Essential to Ocular and Mental Development. (Dis.) Jour. Amer. Inst. Homeop., v. 11, p. 1255.

Sheard, C. Ophthalmic Use of Wellsworth Crookes' Lenses. Amer. Optical Company Bulletin. Southbridge, Mass., 1919.

OPHTHALMIC SOCIOLOGY, EDUCATION AND HISTORY.

Bordley, J. Jr. Reeducation of Blind Soldiers. Amer. Jour. Ophth., v. 2, p. 285.

Calcutta Eye Hospital. Brit. Jour. Ophth., v, 3, p. 208.

Cause of Optic Atrophy. (Medico-legal) Med. Rec., v. 95, p. 688.

Clemen, O. Care of Blind. Zeit. f. Augenh., v. 39, pp. 94-97.

Derby, G. S. Work with British Expeditionary Forces in France. Arch. of Ophth., v. 48, pp. 217-226.

Fergus, A. F. Panel Ophthalmic Practice. Lancet, May 3, 1919, p. 758.

Heldman, M. H., and Parker, E. F. Training in Ophthalmology. Amer. Jour. Ophth., v. 2, p. 301.

Jackson, E. Allies in Ophthalmology. Amer. Jour. Ophth., v. 2, p. 297.

War Ophthalmology. Amer. Jour. Ophth., v. 2, p. 363.

Training for Ophthalmic Practice. Amer. Jour. Ophth., v. 2, p. 298.

Donders and Graefe. Amer. Jour. Ophth., v. 2, p. 300.

Lancaster, W. B. Research Work on Problems of Aviation. Arch. of Ophth., v. 48, p. 287. Amer. Jour. Ophth., v. 2, p. 286.

London the Center of Postgraduate Work in Ophthalmology. Brit. Jour. Ophth., v. 3, p. 205.

Musy, T. Were the Babylonians Acquainted with Gray Cataract? Zeit. f. Augenh., v. 35, pp. 311-322.

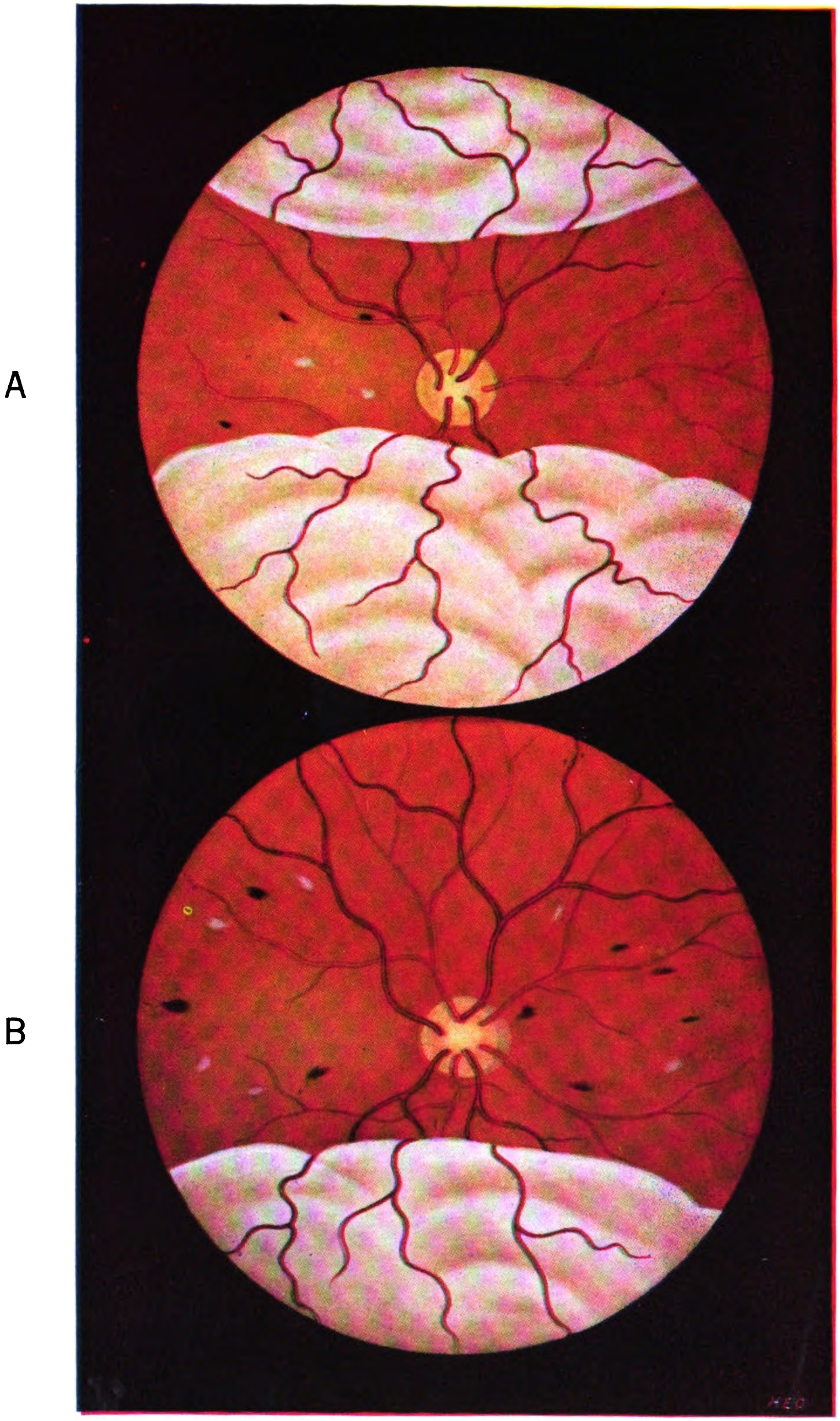
Oxford Diploma in Ophthalmology. Brit. Jour. Ophth., v. 3, p. 205.

Parker, W. R. Activities of Division of Surgery of Head, Office of the Surgeon General, Washington, D. C. Amer. Jour. Ophth., v. 2, pp. 319-322.

Pekelharing, C. A. Franciscus Cornelius Donders. Janus, Jan.-Feb., 1919, pp. 57-76.

Sharp, W. N. Eye Lesions in Regard to Industrial Organizations and Insurance. Indianapolis Med. Jour., v. 22, p. 241.

Wiener, M. Army School of Ophthalmology. Amer. Jour. Ophth., v. 2, pp. 322-326.



DETACHMENT OF RETINA IN TOXEMIA OF PREGNANCY. (CLAPP)

AMERICAN JOURNAL OF OPHTHALMOLOGY

Vol. 2 JULY, 1919 No. 7

DETACHMENT OF THE RETINA IN ECLAMPSIA AND TOXEMIA OF PREGNANCY.

C. A. Clapp, M. D., F. A. C. S.

BALTIMORE, MD.

This paper reports a series of cases seen in Maternity Hospitals (case VI in Johns Hopkins) of Baltimore in a period of sixteen months; representations of the fundus appearances presented in each of the twelve eyes.

While lesions of the eye, extending thru all of the different tissues from the conjunctiva to the optic nerve have been reported with more or less frequency in albuminuria of pregnancy and its allied conditions, it is extremely rare to find any mention of detached retina. Of the various text books upon the eye, Weeks[1] mentions its occurrence but not its frequency; Parsons[2] Pathology of the Eye, under heading of pregnancy, does mention retinal detachment as being occasionally present; and under bibliography refers to an article by Del Zoppo and Soli[3] in which they call attention to the rather close association between genital conditions and eye lesions, and cite a report by Baduel[4] of a woman who had a small detachment of the retina in five succeeding pregnancies, with complete reattachment following each delivery.

De Schweinitz[5] speaks of the changes in general being a widespread "neuro-retinitis with hemorrhages and exudates. Martin Cohen[6] reports a case of double detachment in a colored woman of twenty-six, which showed two discs below each nerve head, a typical detachment of the retina. One week later the detachments were much less in extent and eventually reattached completely. Rochon-Duvigneaud[7] claims that some depreciation of vision of permanent nature occurs in 13.33 per cent of albuminuric cases, and that retinal detachment is of frequent occurrence. The Encyclopedia of Ophthalmology says "This is a very rare lesion and probably due to long, difficult labor. Chance[8] believes that these albuminuric cases are not nephritic, as the kidney does not show an inflammation; but a degeneration of retinal epithelium, while ophthalmoscopically neuro-retinitis with hemorrhages and exudates are seen. He makes no mention of retinal separation. While other cases are undoubtedly on record I have been unable to locate them.

I have examined the eyes of practically all of the albuminuria and toxemia cases, occurring in the past fourteen years at the Maryland Lying-In Hospital, and have not observed detachment of the retina until recently. Six cases have presented themselves since December 1917, whose histories briefly are as follows:

Case I.—R. W. (white), age 35. Second pregnancy.

Family history: Father died at forty-five from nephritis; one sister died at twenty-nine from diabetes; one brother died at thirty-one from some kidney trouble.

Present history: Had pronounced edema of legs at sixth month of pregnancy which became gradually worse. On December 17, 1917, vision became dim and on the evening of the 19th she went to bed with headache and vomiting. She was seized with a convulsion about midnight, having eleven convulsions before entering the hospital at 4

a. m., and followed by five within the hospital.

Upon admittance patient's tongue was much swollen, with presence of general edema. B.P. 180/110. Child was delivered still born at 11 a. m. Urine showed presence of albumin without casts.

I first saw the patient at 2 p. m. on December 20, 1917, making the following notes: "Patient has been getting morphin and pupils are contracted, so that it was necessary to dilate pupils before examining fundus. Examination by direct method shows in O.D. general edema of retina, with dark prominent veins, especially above nerve head, with some exudates and hemorrhages, and with appearance of flat detachment of retina below; but patient very restless during examination. O.S. shows general retinal edema but no exudates or hemorrhages." Patient was put on general eliminative treatment, hot packs, etc.

December 22, 1917, direct examination with dilated pupils shows large typical detachment of retina above and one below in right eye, with marked edema of retina, while left eye shows large detachment below disc. See Plate X, A, and Fig. 1.

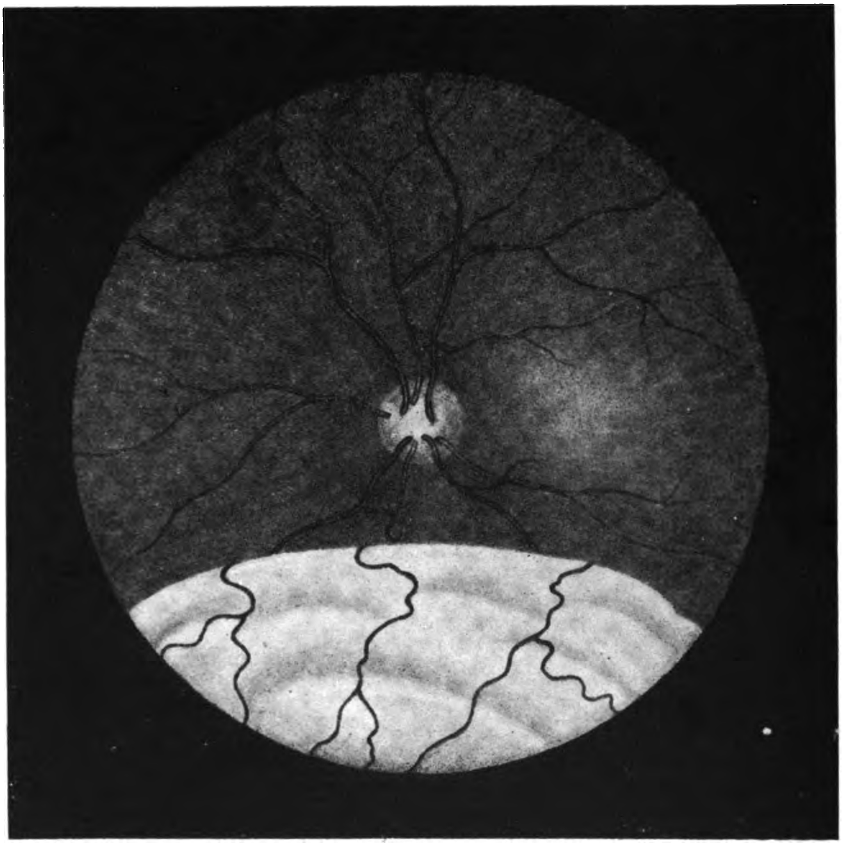


Fig. 1. Case I. Left eye. Retina detached below.

December 27, 1917, with undilated pupils no detachment could be made out above in O.D., and both lower detachments seem to be lessening.

December 29, 1917, pupils dilated. Upper detachment in O.D. has entirely disappeared, while lower one is regaining fundus reflex. O.S. shows greater elevation than right with few hemorrhages above macula and general retinal edema with disturbed choroidal pigment.

January 1, 1918, pupils somewhat dilated but react to light. Both lower detachments appear as flat elevations with entire disappearance of hemorrhages and exudates.

February 25, 1918, examination at office showed slight pallor of each nerve with numerous pigmented areas thruout fundi, especially pronounced near right macula; no raised retina. Vision: Right eye, +0.50=20/50; left eye, +0.50=20/70.

March 23, 1918, fields normal: no change ophthalmoscopically. Vision: Right eye, 20/30—; left eye, 20/20—.

Case II.—I. P., (white), age 31.

Family and past history, negative.

Present history: Has had normal pregnancy until five weeks ago, when she began having some disturbance of vision which has gradually become worse. Patient entered hospital March 28, 1918, and was delivered on the 29th; child cyanosed. Blood pressure on entering 180/120, with pulse rate of 120; Wassermann negative. Functional kidney test on April 26, 1918, showed 50 per cent in first hour and 25 per cent in second hour. April 10, urine showed albumin trace. Child died of inanition on April 4, 1918. Pulse on entering hospital 125, on leaving 90. Blood pressure 150/115. Clinical diagnosis was eclampsia, with chronic interstitial nephritis.

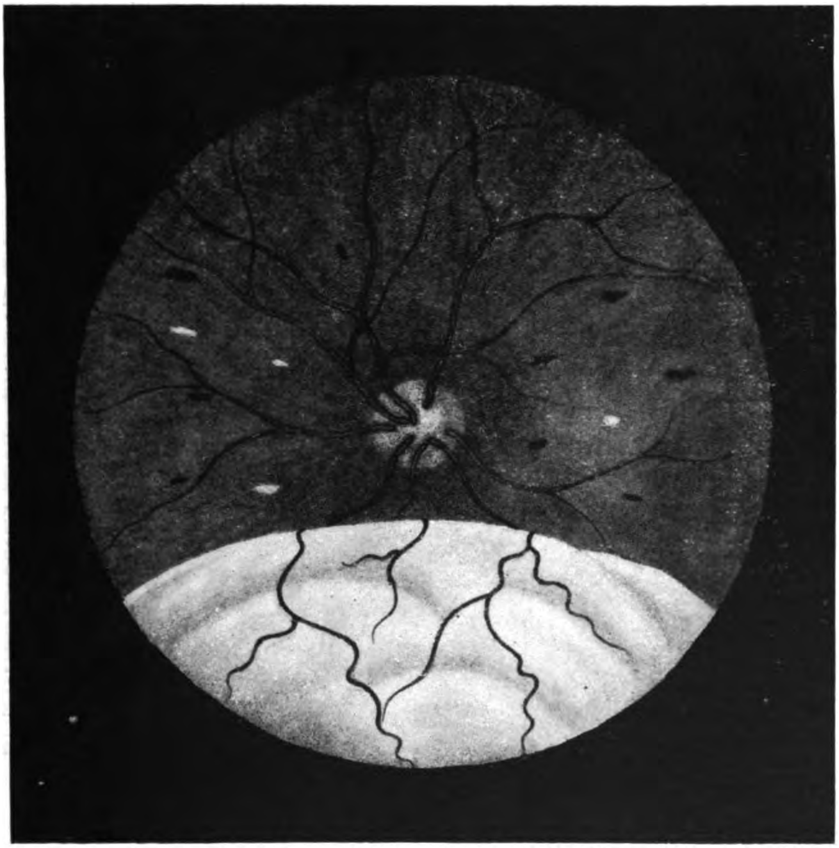


Fig. 2. Case II. Left eye. Retinal hemorrhages and exudates, and detachment below.

Eye examination April 1, 1918. Direct ophthalmoscopy with dilated pupils showed swelling of each nerve head, marked fullness and tortuosity of retinal vessels, pronounced retinal edema. Three disc diameters below each nerve head is a large classical detachment of the retina, being a little larger in the right eye. Plate X, B.

Examination of eyes on April 6, no change was seen. April 13, 1918, same condition as at first examination, with the addition of numerous exudates and hemorrhages about right nerve and left more elevated than at first. April 16, 1918, detachment in R larger with increase of tortuosity of vessels and also hemorrhages and exudates. See Plate X, B, and Fig. 2. April 23, 1918, no noticeable change with exception of a ½ star-shaped figure at temporal side of right macula and also at nasal side of left macula. April 27, 1918, no change in ophthalmoscopic picture.

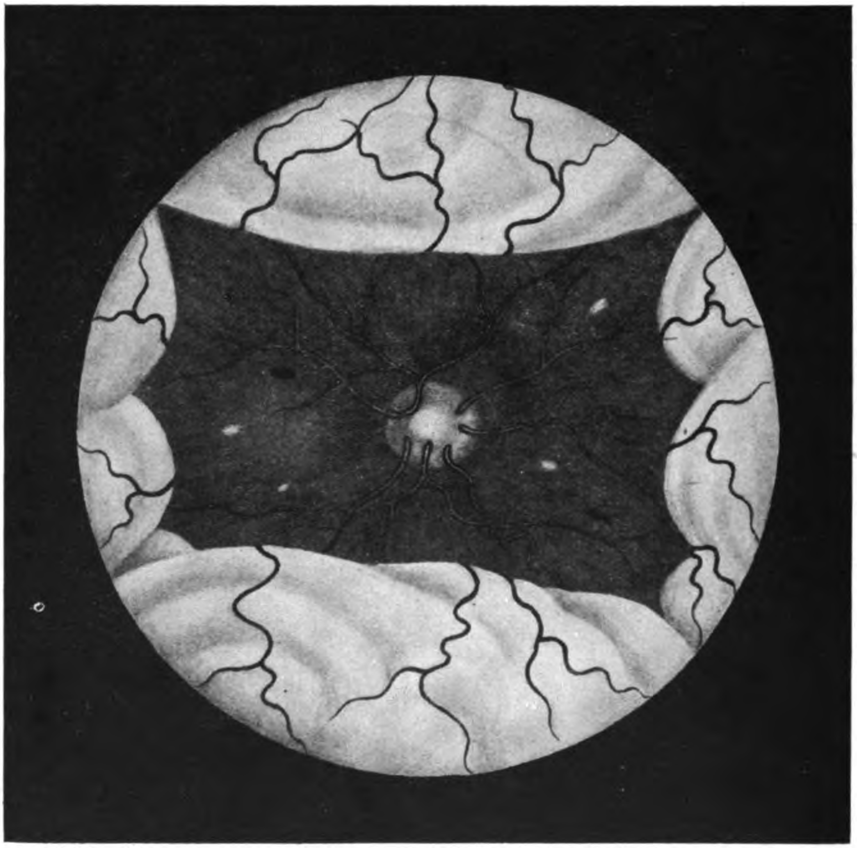


Fig. 3. Case III. Right eye. Retinal detachment encroaching from all sides, exudates and hemorrhages.

May 7, 1918, both detachments appeared smaller with very numerous hemorrhages and exudates and blurred nerves; exudates at macula less marked. June 10, 1918, V.:

O.D. —1.00 ⊃ —1.00 cyl. ax. 180 = 2/200.

O.S. —1.00 ⊃ —1.00 cyl. ax. 180 = 20/200. No detachment could be made out, but neuro-retinitis still existed with some laying down of connective tissue, especially along vessels. July 22, 1918, V.:

O.D. —1.00 ⊃ —1.00 cyl. ax. 180 = 20/40—.

O.S. —1.00 ⊃ —1.00 cyl. ax. 180 = 20/100. Nerve heads still indistinct, but with good color, few exudates and hemorrhages which are absorbing. Connective tissues being laid down about vessels still more prominent. Fields showed concentric contraction which would rather suggest beginning atrophy of optic nerves, altho their color was still good.

September 18, 1918, nerves had good color. All active conditions subsiding. Vision, R. = 20/70, L. = 20/30—.

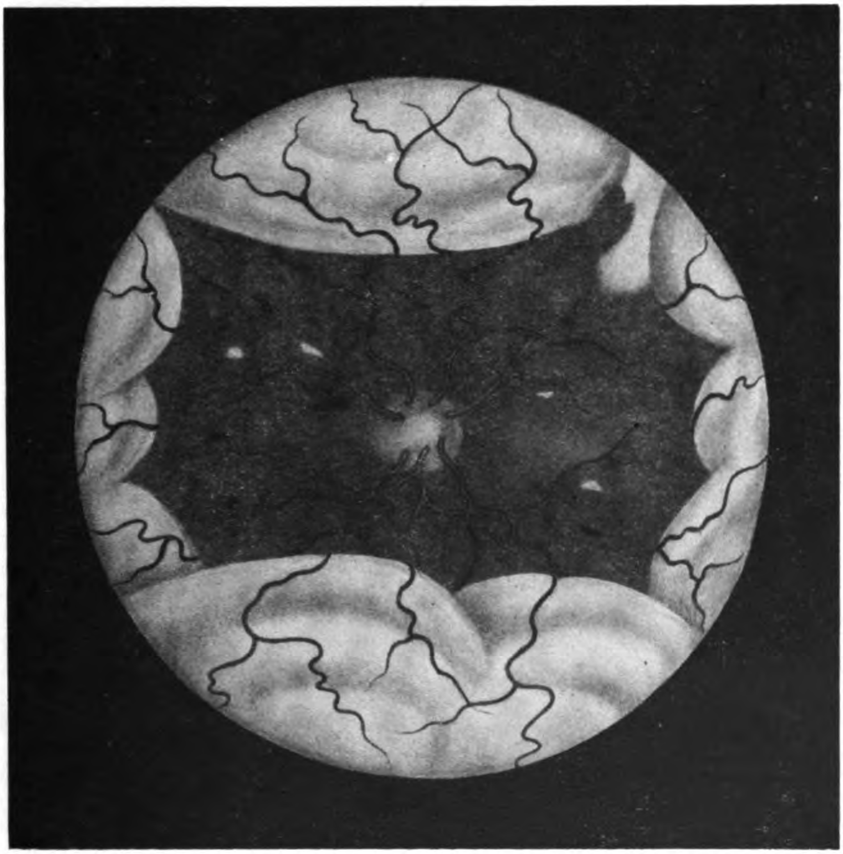


Fig. 4. Case III. Left eye resembling the right eye but with larger hemorrhages.

CASE III.—E. B., (colored), age 38. Entered hospital June 25, 1918.

Family and past history, negative.

Present history: This is a fourth pregnancy and everything appeared normal until two weeks ago, when vision began to fail. Patient walked into hospital and was put to bed. Blood pressure 270/160; urine showed albumin with hyalin and granular casts. Membranes were ruptured and still born child delivered on June 26.

June 27, 1918, eye examination. Pupils dilated and ophthalmoscope reveals almost complete detachment of each retina. Right eye shows (Fig. 3) a very large detachment extending horizontally across the lower part of fundus and upward to within about one disc diameter of nerve head. There is another detachment above, which is not quite so large and these detachments are connected at each end by several smaller detachments, giving one the impression of looking down a cylinder. There is blurring of nerve outlines, with general edema of the retina, with few small exudates and hemorrhages. Left eye shows (Fig. 4) practically same condition except that the upper detachment seems to be larger than the lower, and at the temporal extremity of the upper detachment there is a large exudate bordered by a hemorrhage

July 9, 1918, fundus reflex seen in all parts of fields, nerves still indistinct, considerable twisting of vessels with apparently some fluid under the retina at the periphery, and numerous exudates about left nerve. Patient was treated by hot packs, salt solution, etc. Patient became delirious and violent and was taken home by relatives against physician's advice on July 9, 1918.

July 24, 1918, patient examined at home; mental condition good, claims to see *well*. Examination shows neuroretinitis, but no detachment. July 31, 1918, at office, V. = O.D. 2/200, O.S. 20/100, no detachment visible. August 8, 1918, fields practically normal for form and no detachment can be seen, with undilated pupils. Both pupils dilated; still a well-marked neuroretinitis, but swelling of nerve heads subsiding and no detachment visible. V. = O.D. 20/200, O.S. 20/100.

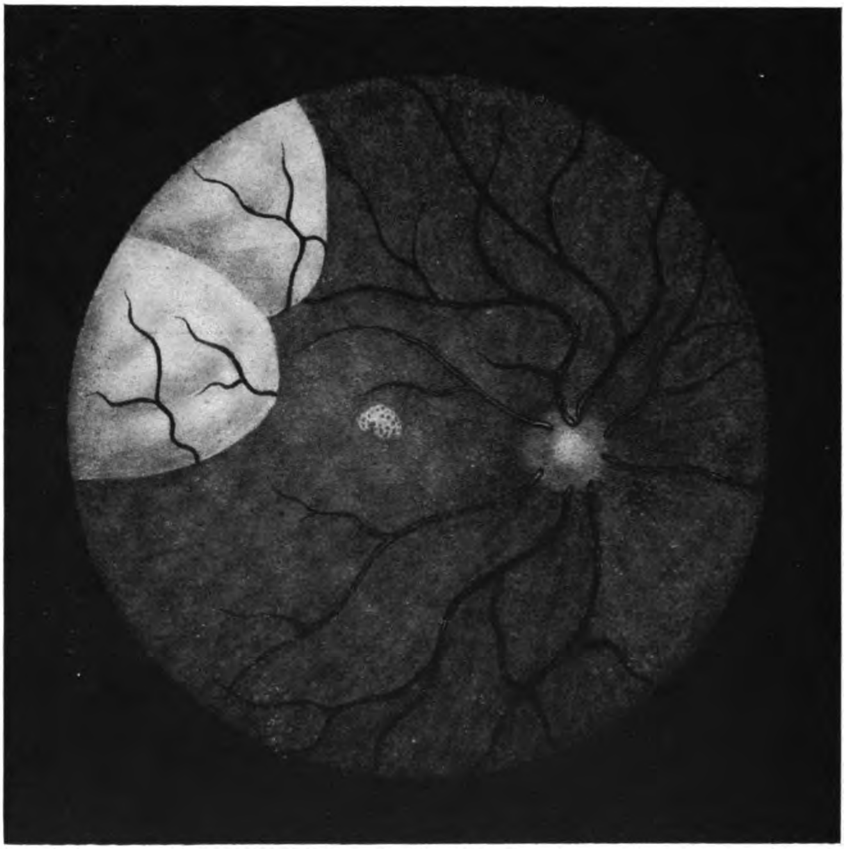


Fig. 5. Case IV. Right eye. Edema of retina, small detachment, central exudate and hemorrhage near disc.

CASE IV.—R. M. Aet. 26. November 15, 1918.

Family, personal and marital history unimportant.

Present history: Patient walked into hospital and examination showed nearly full term pregnancy with marked edema of face and abdomen. Patient complains of headache, dizziness and dark spots before eyes. Patient was restless and anxious; B. P. 170/92. Eliminative treatment inaugurated.

November 16, 1918, urine report shows albumin with hyalin casts. Patient very uncomfortable with nausea and vomiting. B. P. 195/120. Hot packs and eliminative treatment continued.

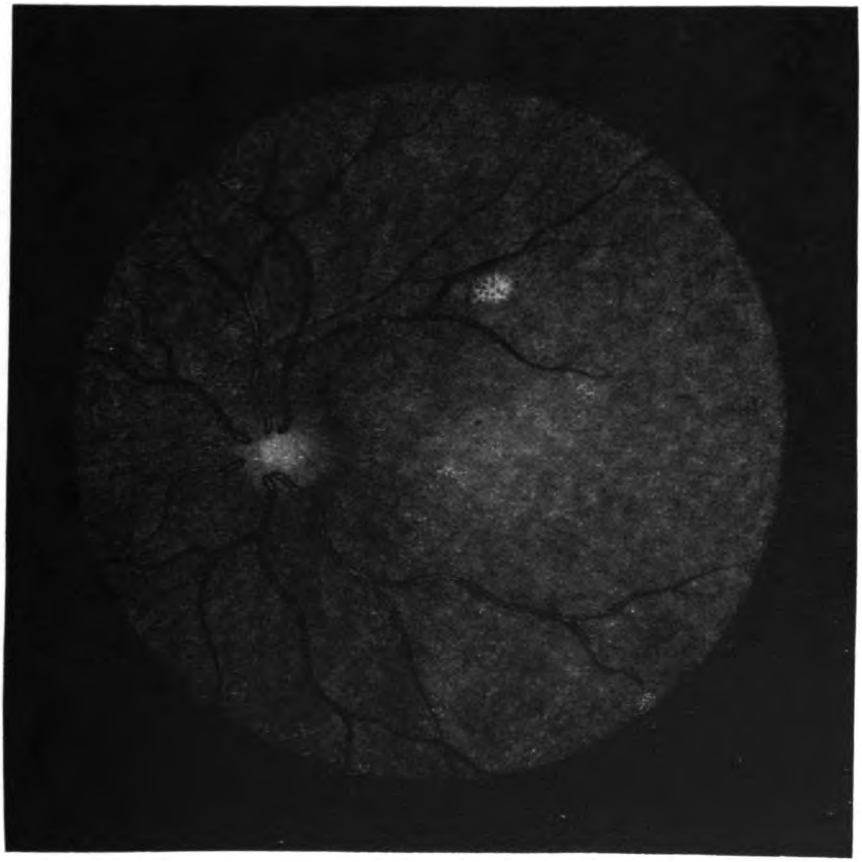


Fig. 6. Case IV. Left eye. Retinal edema, exudate and minute hemorrhages.

November 17, 1918, B. P. 170/120. Labor pains commenced at 4 p. m.

November 18, 1918, pains continued thru day with pronounced headache and nervousness, and blurring before eyes.

November 19, 1918, patient showed signs of exhaustion and child delivered instrumentally at 11 a. m. Patient was continued on eliminative treatment with clearing up of edema and albumin, being discharged in fair condition on December 2, 1918.

Chart notes in reference to eyes were as follows: 11-19-18, 4 p. m.: Both pupils normal in size. Fundi examined by direct method with undilated pupils gave impression at first that there was no lesion outside of slight edema of retina; but in looking in periphery of fundus in O.D. was discovered a whitish reflex which upon closer scrutiny proved to be a detachment. See Fig. 5.

Pupils were then dilated with one drop of homatropin. Right eye shows practically entire obliteration of nerve outlines with general edema of retina. Just below and to nasal side was a small diffuse hemorrhage, while just above macula there was an area of infiltration through which the retinal reflex could be seen in places.

Retinal edema became more marked as one followed the superior temporal vessels outward until some little distance beyond the macula, where was found a good sized detachment of the retina, the lower portion extending to the temporal equator having most fluid beneath the retina while the upper fold faded away to normal retinal level.

Left eye showed physiologic cup filled in and nerve borders indistinct, general retinal edema especially about nerve and macular region. Just above macula in close proximity to a vessel there is a thin exudate, while just above and to the temporal side are seen two small hemorrhages, the one nearest the nerve being a minute linear one, and the more distal one being several fine points. See Fig. 6.

11-28-18: Fundi examination with undilated pupils shows, O.D. blurring of optic nerve with two areas of thin exudates near macula. Upper outer quadrant shows no detachment of retina, but numerous small pigmented areas; no hemorrhage found. O.S. shows blurring of nerve, with thin exudate near macula, hemorrhages absorbing. Fields taken by Peter's campimeter show normal outlines.

12-1-18: Pupils dilated, no ophthalmoscopic change in findings from November 28, 1918.

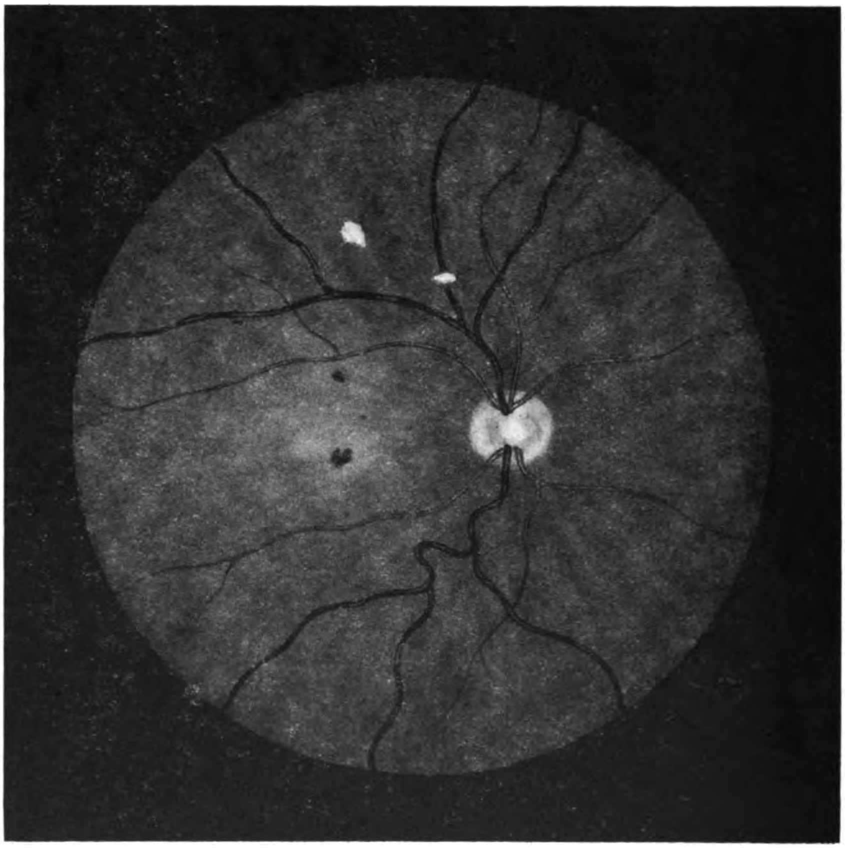


Fig. 7. Case V. Right eye. Retinal exudates and hemorrhages.

Case V.—Mrs. F., (white), age 40. Entered the hospital February 8, 1919.

Family history negative. Marital history, eleven children without previous trouble. Present history, entered the hospital with history that eyes had been getting blurred for five days, which condition had been growing worse.

Examination upon entrance showed

patient eight months pregnant, blood pressure 205/110 and presence of marked albumin, with red blood cells and hyalin casts in urine.

Eye examination 4 p. m. on February 8, with dilated pupils and direct examination showed blurring of right nerve head, vessels large and tortuous, with marked edema of the retina, especially about macula, and several exudates and hemorrhages; the exudates being most marked along the superior temporal vessels, while the hemorrhages were near macula and below. Lower temporal vessels seemingly raised and more tortuous than others. (See Fig. 7). Left eye showed same condition about nerve, with tortuosity of vessels and edema of the retina. There was rather a large exudate just above macula near vessel; no hemorrhages seen. About two nerve heads below disc, retina was detached, with typical white appearance, more on the order of a very large wrinkle than complete detachment, as slight pinkish reflex could be made out in the periphery. (See Fig. 8).

February 9, 1919. Eye examination, just after delivery of a male child, weight 5¼ lbs., no change could be noted. February 10, 1919, fundus examination showed no change in the right eye, but left eye showed an almost complete return of the retina to its bed, so much so that we were unable to demonstrate any detachment. Patient continued to show a neuroretinitis, with hemorrhages and exudates in right eye and exudates in left, until March 4, when she insisted upon leaving the hospital. Blood pressure was

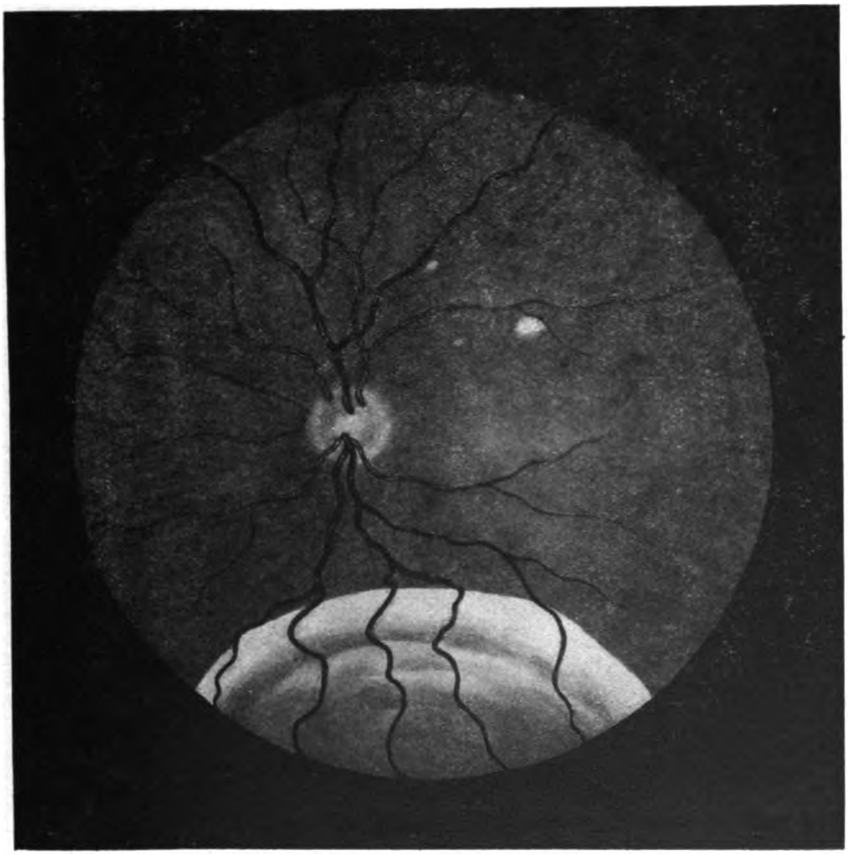


Fig. 8. Case V. Left eye. Detachment below, exudates above.

then systolic 145, with a trace of albumin in the urine.

CASE VI.—L. H., (white), age 33. Hopkins Maternity Ward.

History: Has had eight children, all living. Four weeks ago began to have swelling of limbs and was admitted to maternity ward on March 15, 1919, with edematous condition very marked. B. P. 205/110. Urine showed albumin and casts. Patient was delivered March 16, 1919, and this was followed by a couple of convulsions. Patient states she has had poor vision for two or three weeks.

Eye examination on March 19, at 5 p. m. showed pronounced blurring of outlines of right nerve, with retinal edema, vessels large and tortuous; as superior temporal vessels were followed outward there was noted increased tortuosity with definite elevation of retina measuring between 6 and 7 diopters. Pinkish reflex was present thruout this region, but definite wrinkling of retina was seen, several small exudates were noted in the edematous area about nerve and macula and one small hemorrhage near lower inferior nasal vessel. (See Fig. 9).

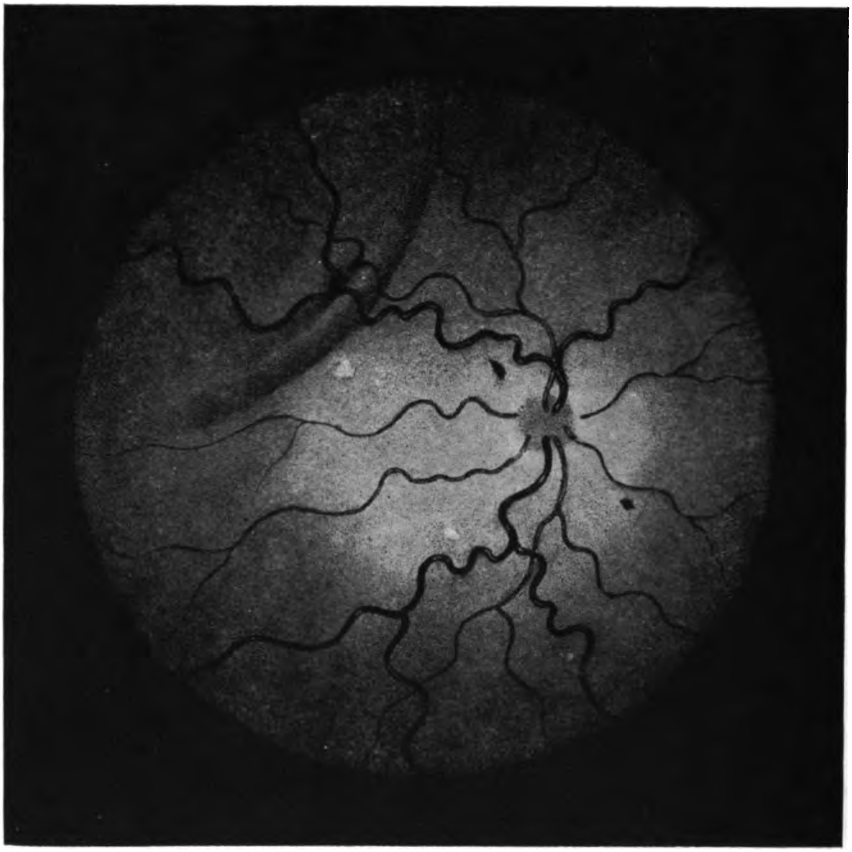


Fig. 9. Case VI. Right eye. Retinal edema, enlarged vessels, and fold of detachment up and out.

Left fundus showed same general condition as right, in the blurring of nerve head, retinal edema and small exudates and hemorrhages and tortuosity of vessels, but these were more pronounced just below and to the temporal side of the fundus, where wrinkling of the inner coat was found and where there was approximately the same elevation as in O. D., from 6 to 7 dameters. (See Fig. 10)

March 20, 1919, 3 p. m.: No change in fundi, with possible exception that elevation in O.D. may be less, patient says she sees much better.

March 22, 1919, no elevation of retina in either eye but neuroretinitis still present. Patient states she can see much better.

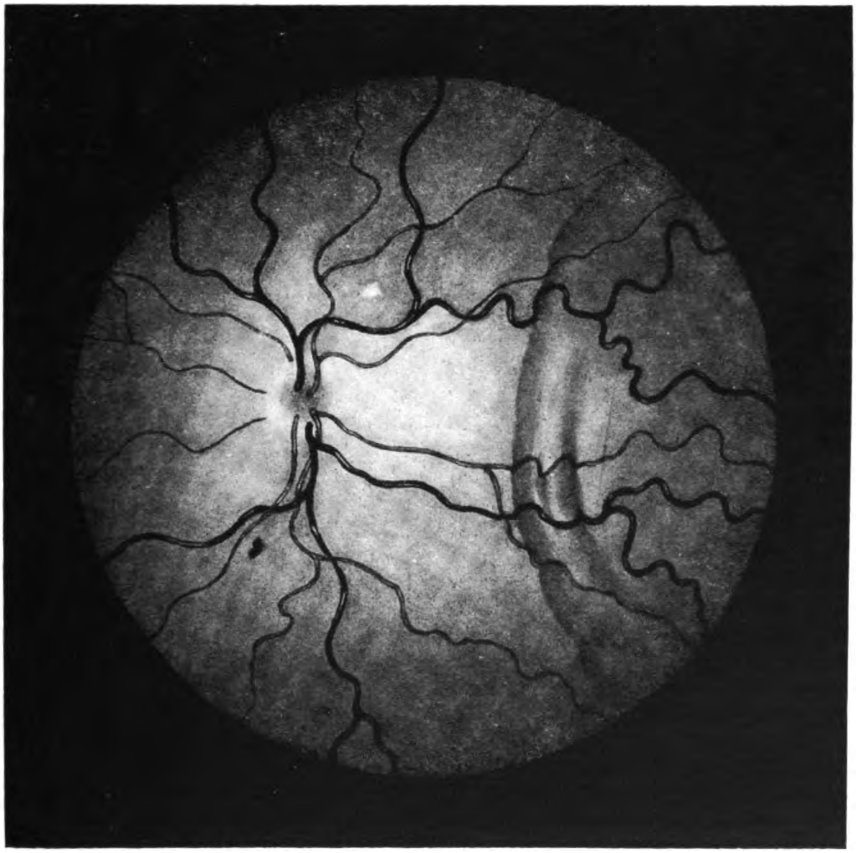


Fig. 10. Case VI. Left eye. Fold of detached retina outward.

April 8, 1919, both fundi show some neuritis, with edema of retina, exudates and hemorrhages.

REMARKS.

It is claimed by some obstetricians, that cases of toxemia or eclampsia which show eye changes, are always secondary to a kidney lesion.

To be sure detached retinas have been reported in cases of pure nephritis, as Jones[9] cites the case of a man having nephritis with double detachment in each eye, and Batten[10] double detachment in a boy having nephritis.

While one can easily see how in any case of inflammation of the inner coats of the eye associated with edema, one could most easily have this transudation poured out under the retina thus producing a detachment, its infrequency of record in this class of cases is not so easily explained. Many cases of eclampsia show edema of the retina extending from margins of nerve out towards the periphery, without either hemorrhages or exudates. These have been seen with increasing frequency since the introduction of the electric ophthalmoscope and using the direct method of ophthalmoscopy, especially so in those toxemia cases where unconsciousness of patient makes it often exceedingly difficult to make a thoro examination.

Some are now claiming that the unconsciousness is due to cerebral edema, and one can readily see how an edema of the retina starting most frequently with a slight blurring of the optic nerve and extending peripherally could be associated with cerebral edema, and it requires only to carry this pathologic phase one or two steps further to conceive this accumulation in such quantities as to cause separation of the retina from its bed, taking place most frequently in the lower part of fundus first, and then if the condition is not arrested continuing the separation around the entire circumference. When this stage arrives it would be logical to expect that both serum and blood would find their way outside of the vessels and lymphatics, producing exudates and hemorrhages. So much for our hypothesis, now how is it borne out by facts in our cases under observation? In the first case at the first examination, the patient was in profound stupor but the pupils were dilated and both fundi examined by direct method with result as described. Two days later imagine our surprise in finding such a change with double detachment in the right eye and a very large single one below in the left.

Baehr[11] asserts that both coma and convulsions are usually if not always due to cerebral edema either general or localized, and whether this occurs as a result of trauma or from influence of toxins the end results are similar. One is struck by the similarity of fundal pictures as seen in most cases of toxemia of pregnancy with its slightly blurred nerve head and retinal edema and those cases of fractured skull where the eye findings are usually of like degree in blurring of nerve head and edema of retina.

Wilson[12] and Snyder[13] report cases of eclampsia that ceased having convulsions as soon as lumbar puncture was performed, while Zangemeister[14] devotes fifty pages to arguments sustaining the contention that the clinical symptoms (convulsions) are due to intracranial edema.

The mechanism of detachment of the retina as contended by Leber[15] and Nordenson, a fibrillary change in the vitreous, does not seem in these cases to be at all apropos, but it seems more on the order of Raehlman's[16] theory of diffusion.

The first case will not bear out the contention that ophthalmoscopic changes never occur in eclampsia for a case having sixteen typical convulsions would certainly be classified as eclampsia; nor would any of these cases substantiate the theory of excessive congestion except the possibility of case IV. as cases II. and V. occurred before parturition and cases I., III. and VI. were not difficult.

Diagnosis: While the condition as it existed in these cases was very definite and if seen could not have been mistaken by even a novice, I am of the decided opinion that many more cases of detachment occur in eclampsia than are reported and that these occur far in the periphery and are frequently overlooked. Another point which certainly should be kept in mind is a rather frequent examination of these cases, and always with a widely dilated pupil. This is strikingly illustrated in cases I. and V., as the initial examination in case I. was not startling, but a few days later the appearance was far from reassuring and in case V. if examination had been deferred, as frequently happens, no detachment could have been found. Then again let me plead for a very careful paistaking examination, as cases I. and III. were very difficult of examination with the ophthalmoscope, and as the fundi were studied only after some effort; and case IV. was only discovered after careful searching of the periphery. One must also keep in mind the flat detachments as seen in case VI., where definite elevation and wrinkling were found but where the fundus reflex is not lost. It is quite probable that this case had typical detachments and was in the receding stage when first examined.

Prognosis: Altho the appearance is disheartening, and one is likely to give a very grave prognosis as one becomes accustomed to do in idiopathic detachments, here the prognosis depends not so much upon the amount of detachment, but upon the accompanying neuroretinitis as well as upon the length of time that this has existed. The prognosis in reference to the detachment is exceptionally good as evidenced in this report, and also of cases cited, but as to ultimate vision it must of necessity be guarded as the neuroretinitis is often followed by marked permanent impairment of functioning retina.

Treatment: Altho eliminating treatment is essential after the condition is well marked, the most important treatment is prophylactic. In this age of modern medicine when blurring of vision occurs in any stage of pregnancy, and especially in the latter months, there should be a most careful and painstaking fundal examination, and in cases where there is found neuroretinitis, either with or without detachments, certainly from an ophthalmologic standpoint, premature delivery is justified.

While none of this series was treated by spinal puncture, I feel certain that repeated spinal puncture is a procedure that is at least worthy of trial.

As to local treatment I am inclined to the belief that negative is as valuable as positive treatment, and that nearly the entire result depends upon active elimination as outlined by the attending obstetrician. Case I. had active local treatment in the form of pressure, bandage, recumbent position, etc., but one could see no more marked improvement than in cases II., III., IV., V. and VI., where little or no local treatment was used. To be sure cases II., III. and V. did not have such good end results, but that occurred as a result of the neuroretinitis, which was of longer duration with more extensive scarring of retinal and nerve tissue, while case IV. I am sure had good end results, altho I was never able to get her to return to check up the vision, and case VI. is still in the hospital.

Summary: Retinal detachment in eclampsia is, according to most authors, a very rare condition and conspicuous by a paucity of literature. Six such cases have been under our observation since December, 1917, varying in extent from small to almost complete detachment of the retina. In contradistinction to so-called iodiopathic detachments, these have all subsided and become reattached with normal fields of vision.

They may be antepartum or postpartum, and may clear up in a few hours, and are frequently far forward in the periphery and found only after some searching. They are probably present much more frequently than heretofore recorded, and the prognosis is good so far as the detachment is concerned.

BIBLIOGRAPHY.

1. Weeks. Text-Book of Diseases of the Eye.
2. Parsons. Pathology of the Eye.
3. Del Zopo and Soli. Ann. di Ottal. v. xxxiii, 1904.
4. Baduel. Rivista Critica de Clinic Medica, 1902.
5. De Schweinitz. Text-Book of Diseases of the Eye.
6. Cohen, M. Trans. New York Acad. Med. Ophth. Sec., March, 1914.
7. Rochon-Duvigneaud. Rev. Prat. d. Obstet. et Gynec., May, 1912.
8. Chance. Ophthalmic Record, v. 26, p. 346.
9. Jones, W. L. Jour. Amer. Med. Assn., v. 64, p. 334.
10. Batten. Proc. Royal Soc. Med. Sect., July, 1914.
11. Baehr, E. M. Lancet Clinic, 1914.
12. Wilson, W. T. Jour. Amer. Med. Assn., Sept. 2nd, 1916.
13. Snyder, J. W. Jour. Amer. Med. Assn. Sept. 29, 1918.
14. Zangemeister, W. Zeit. f. Geburt. u. Gynecol., v. 79.
15. Leber. Bericht f. Ophthal. Gesellsch., 1882. Arch of Ophth., 1909.
16. Raehlmann. Arch. f. Ophthal. v. 27.
17. Jessop. Brit. Med. Jour., March, 1907.
18. Lawes. Australian Med. Gaz., Oct. 1908.
19. Dolganoff. Deutsche med. Woch., Oct. 1911.
20. Verderame. Klin. Montsabl. f. Augenh., 1911.
21. Randolph. Johns Hopkins Hosp. Bull. 1895.
22. Greenwood. Boston Med. and Surg. Jour. 1903.

CONJUNCTIVITIS DUE TO FOOD ANAPHYLAXIS.

Frank A. Conlon, M. D.

LAWRENCE, MASS.

This paper calls attention to an unusual condition of extreme interest and some practical importance, and reports three cases.

It has long been known that certain foods, when eaten by individuals peculiarly sensitive or anaphylactic to these foods, develop certain symptoms or ill effects. Among the better known disturbances are urticaria, eczema, vasomotor rhinitis, angioneurotic edema, and bronchial asthma.

I shall produce evidence to show that conjunctivitis unaccompanied by any other manifestation may also be produced by the proteins of commonly used foods which up-to-date have not been recognized as causes of this disease. My attention was called to this possibility by stubborn inflammations of the conjunctiva recurring in the same patient at or about the same time year after year. Most of these cases had been treated for a considerable period of time before I saw them but had never had any treatment that permanently relieved or shortened the attacks. For a time the determination of the offending food was by either guess work or elimination. When the food happened to be a fruit or a vegetable which was eaten only at certain times of the year the diagnosis was comparatively easy. For a number of years I have seen cases in which I considered certain foods as possible causes of this recurring conjunctivitis, but owing to lack of coöperation and careful observation on the part of the patients I was not definitely convinced that such was the fact.

In the summer of 1915 I was very fortunate in having for a patient a young man who was not only intelligent and observing but who was willing to carry out any and all suggestions I proposed. For five or six years he had suffered from "sore eyes," which generally began in May and continued off and on till late in the fall. When I first saw him his lids appeared somewhat reddened and swollen, with a suggestion of a slight ptosis such as one sees in trachoma. The bulbar conjunctiva was markedly hyperemic, with a more moderate hyperemia of the palpebral conjunctiva. During the following two years he definitely proved to me and himself that his conjunctivitis was due to eating either strawberries or tomatoes. The patient was convinced long before I was. He would report in the afternoon with a conjunctiva that appeared normal, then eat freely of tomatoes or strawberries and return the following day with the usual "sore eyes."

During the time he has been under observation he has never had his "red eyes" except after eating one of the offending foods, nor has the eating of these foods ever failed to cause a hyperemia of the conjunctiva. Last fall this patient reported again, saying that some new food was causing a recurrence of his old trouble. The protein skin tests showed no new sensitization. I did find, however, that he had indulged in a catsup which contained tomatoes. We then found that this, when eaten on baked beans, always brought on a marked conjunctival hyperemia.

The protein skin test is the one used by Walker[1] in his investigations of the cause of bronchial asthma. The proteins used are prepared by Wodehouse[2], who in 1916 described the preparation and method of manufacture. The skin test is made as follows:

"A number of small cuts, each about an eighth of an inch long, are made on the flexor surface of the forearm. These cuts are made with a sharp scalpel, but are not deep enough to draw blood, although they do penetrate the skin. On each cut is placed a protein and to it is added a drop of tenth normal sodium hydroxid solution to dissolve the protein and permit of its rapid absorption. At the end of a half hour the proteins are washed off and the reactions are noted, always comparing the inoculated cuts with normal controls on which no protein was placed. A positive reaction consists of a raised white elevation or urticarial wheal surrounding the cut. The smallest reaction called positive must measure 0.5 cm. in diameter."

The use of the skin test makes the diagnosis comparatively easy and cases are now found that ordinarily would escape detection. The majority of these cases are of moderate conjunctival injection and generally the patient's only complaint is as to the appearance of his eyes.

These patients may, however, present very annoying eye symptoms, as the following case will show.

A. B. R., 56 years, male, merchant.

For the past four or five years he has been unable to read for more than five minutes at a time without, as he expresses it, "a feeling of sand in his eyes, the lids feel constantly as they do when one is very sleepy." He has rather frequent, sudden attacks of lacrimation, which come on without any known cause and stop as suddenly as they started. He says that he has had a perfectly miserable time of it for the past couple of years, with practically constant eye discomfort; so he became an "early to bed and late to rise" sort of a fellow, as the only time he was at all comfortable was when his eyes were closed. His glasses had been changed a number of times, tinted lenses had been ordered and worn, drops of various kinds and colors had been prescribed and used without any benefit whatsoever. The eye lids were slightly swollen and congested and there was a general enlargement of the conjunctival blood vessels which was more marked on the bulbar conjunctiva. Nothing found in nose or throat. General condition good. No bad habits, did not smoke or drink, and I could not find any change necessary in his glasses. The elimination of eggs from his diet was shortly followed by a total disappearance of his annoying symptoms. For the past two years he has been able to use his eyes as he wished, and he informs me that life is once more worth living. One control test followed by a return of his symptoms was all I could persuade this patient to make.

On a recent skin test with some thirty odd proteins this patient reacted to egg alone. This case is of additional interest in that as a child he suffered for eight or nine years from asthma and then later in life from hay fever. It may be that as a child he had a bronchial asthma from some food protein, outgrew this sensitization, and then became sensitized to rag weed or timothy pollen, to which in time he also became antianaphylactic, only to develop a few years ago a sensitization to egg protein.

The skin test should be made at the time the patient is suffering from the conjunctivitis, as in some people the anaphylactic reaction disappears after the patient abstains from the offending food any length of time, to reappear again on eating it.

In other cases one finds a positive reaction where the patient has eaten the offending food but once or twice during his whole life.

Talbot[3] has found infants who have never tasted egg, but who gave a positive skin reaction to egg.

In a number of cases the tendency to protein sensitization seems to be hereditary, as frequently the patient will volunteer the information that other members of his immediate family are subject to annoying and, at times, alarming symptoms after eating a special food.

People are frequently found who react to two or more of a group of closely related proteins, while in others the reaction is to one specified protein, as the following case illustrates.

Case 3.—A. H., 28 years. Male. For the past five years this man has suffered from an inflammation of the right upper lid which always occurred during or immediately following his summer vacation. While away he spent most of his time fishing for flounders, which he ate two or three times a day. During the remainder of the year he ate very little fish and never any flounders. Not being able to obtain flounder protein, at the suggestion of Wodehouse I tried sole protein, as sole is a sort of first cousin to flounder, but obtained no results. Thinking that possibly too long a time had elapsed since the ingestion of this fish, two months later I requested the patient to eat flounder a few times so that I could again try the skin test. On the day following a two-meal test the lid inflammation recurred, but the sole protein test remained negative. I now prepared a home-made protein, and with this obtained a positive reaction.

In the absence of uncorrected ametropia, all recurring low grade inflammation of the conjunctiva which the patient calls "frequent attacks of red eyes," should be considered as possibly due to food anaphylaxis. This is especially true when the attacks appear the same month year after year. After obtaining a positive skin test the proof as to this food being the cause of the conjunctivitis is very readily obtained by the patient.

I believe that a number of diseases whose etiology is now grouped under the indefinite head of autointoxication will be found on closer examination to be anaphylactic phenomena.

In conclusion I will add that I also believe that the study of food protein anaphylaxis and bacterial protein anaphylaxis will explain the etiology of a number of eye diseases, especially keratitis and low grade inflammation of the uveal tract, and open up vast and fruitful fields for investigation.

BIBLIOGRAPHY.

1. Walker, I. C. Boston Med. Surg. Jour., vol. 129, p. 288, 1918.
2. Wodehouse, R. P. Boston Med. Surg. Jour., vol. 125, p. 195, 1916.
3. Talbot, F. B. (1914). Boston Med. Surg. Jour., Nov., 1916.

OCULAR LESIONS CONSECUTIVE TO INJECTIONS OF ANTITYPHOID VACCINE, KERATITIS HERPETICA FEBRILIS.

R. Pacheco Luna, M. D.

GUATEMALA, CENTRAL AMERICA.

This paper reports a case of ocular lesions following antityphoid vaccination, and reviews the previously reported cases, and the conclusions that have been drawn from them.

The scientific periodicals have been publishing for one year and a half a series of very interesting articles about the ocular lesions resulting in a small number of persons inoculated with antityphoid vaccine. We add a case in which were observed some points which have been previously noted and published.

Our patient, a German of 52, a bookkeeper by occupation, has resided in Guatemala since his 20th year. He has no pathologic record nor antecedents of any importance. He acclimated himself easily to the tropics, and has always lived in the city (1,500 meters altitude). Three years ago, being on a vacation in New Orleans, he had a herpetic keratitis, following catarrh of the upper air passages, for which he had consulted us on his return; and we could retrospectively trace the picture of the disease by dimness of vision, photophobia, lacrimation, conjunctival and ciliary injection, anesthesia, and dendriform ulceration of the cornea, miosis and hypotension, without pain or elevation of temperature, and no lesions of the face. A general examination was made, but the keratitis could not be attributed to any other cause than the catarrh of the upper air passages which preceded it. Under proper treatment it yielded in due time, leaving a thin, superficial opacity on the anterior part of the cornea, which disappeared completely. Final vision result = 9/10.

During the three years that have elapsed from that time, the eye had been quiet until the 15th of May of the current year. On the evening of the 13th he received a third dose of 1 cc. of Mulford's "Typho-Bacterin Mixed," which contains per cc.:

1,000 millions of dead typhoid bacilli
500 millions of dead paratyphoid A. bacilli
500 millions of dead paratyphoid B. bacilli.

This injection was given on Monday at 6 P. M., and from midnight and all Tuesday he had a fever (39,6°C.), headaches, boneaches and general malaise. In the evening the pain decreased, the temperature fell and a cluster of nasolabial herpes appeared on the right half of the face. On Wednesday, he awakened with an inflamed, red, right eye, photophobia, constant lacrimation and blurred vision.

He consulted a physician immediately, who prescribed a solution of nitrat of silver; but remembering having previously had something similar, in which we had assisted him, he consulted us on Sunday, the 19th.

On that date the picture was the following: Right eye; diminution of visual acuity, photophobia, lacrimation, constant sensation of a foreign body, strong conjunctival and ciliary injection, two central, branching, superficial ulcerations of the cornea. Pupil sluggish and contracted, anesthesia of the cornea. Tension: diminished. In the nasolabial region of the right side I found dried herpetic particles. The teeth, gums, tonsils, nasal fossae and sinuses were healthy, and no area of focal infections was found. The point of injection did not present the least sign of infection.

We thought immediately of a herpes febrilis of the cornea, consecutive to an injection of polyvalent antityphoid vaccine, developed in a subject whose examination did not reveal other causes, but who had among antecedents a previous appearance of catarrhal herpes on the cornea, and to this anteceding lesion we attribute a great importance on which we will report later.

Morax[1] was the first who gave the alarm, publishing a case in whom, after a febrile access caused by an injection of T. A. B., a keratitis herpetica developed, which was of slight importance, since the patient recovered vision completely.

Gloagen,[2] chief of the ophthalmologic clinic of the Maritime Hospital of Cherbourg, records three other cases of keratitis herpetica. In the first case the third injection produced fever of 40° C., headaches, boneaches, which induced the physician to make a lumbar puncture on the following day. That same day an intense nasolabial herpes broke out. Three days later there appeared in the right eye a classic herpetic keratitis and the fluorescein showed the fine ramifications. The affection was cured in eighteen days, but a thin opacity of the cornea persisted which reduced the vision to 0.6.

In the second case the fourth injection was followed by general malaise, headaches, fever (40° C.). After the following day, nasolabial herpes appeared. Three days later, besides a dense palpebral herpes of the upper lid, a typical herpetic keratitis which affected almost all of the cornea, was observed. Cure in 25 days, but an opacity persisted which reduced the vision to 0.1.

These observations relate to herpes febrilis of the cornea. It is very difficult to judge them if they are not submitted to an impartial analysis, owing to the intimate relation which seems to exist between the cause and the effect. An incorrect interpretation would be extremely detrimental to a new prophylactic method which is expected to give incalculable service to humanity. We shall endeavor to interpret these observations for which we need to note other ocular affections which have occurred immediately after vaccination.

The febrile form is one variety of herpes of the cornea. It shows itself in the infectious diseases, accompanied by vesicular eruptions of the skin of the face and of certain mucous membranes; and is considered a toxic neuritis of the trigeminus, the herpetic keratitis being a neuritis of the terminal filaments of the ciliary nerves.

All the observations are identical. One of the inoculations is followed by a febrile access, after which herpes appeared upon the skin of the face and the mucosa, followed by appearance of herpes on the cornea. The injection of T. A. B. is the cause of the fever, and the herpetic appearance. Let us note immediately that this latter is rather exceptional, considering the great number of vaccinations which are made.

We might suppose that the cause of the fever is a microbe, which has developed in a badly prepared or poorly preserved vaccine. We also presume that the microbes can find entrance into the organism by a faulty technic. One can imagine that a febrile access acts by reviving a latent infectious focus, preexisting in some part of the body. However, the microbes secrete toxins which affect certain nerves; or one could finally explain the process, by the action of a proteid substance which developed in the vaccine, and has the property of producing fever and irritation of the trigeminus.

The accepted opinion is that the antityphoid vaccine by itself can be the direct cause of the herpes of the cornea, it not being possible to find another cause. The observation that we present is very interesting because it treats of recurrence and our patient is therefore a subject predisposed to the nervous lesion, which presented itself before in an identical form, without the vaccine having to figure in the etiology of the process. The first time, a catarrh of the upper air passages preceded the lesions of the eye; and now it appears after a reaction of T. A. B., which brings us to the following conclusions: It has been supposed that the febrile herpes of the cornea directly depends upon the antityphoid vaccine; but our observation modifies this opinion because in our patient a predisposition existed.

Prof. de Lapersonne[3] published a case, a résumé of which we reproduce herewith. A soldier, after the second or third injection had multiple abscesses and infectious broncho-pneumonia; and in the course of this pulmonary complication, presented a unilateral metastatic ophthalmia. After such grave general complications he recovered with an atrophied and painful eye, which it was necessary to enucleate some days later. De Lapersonne thinks that the microbes of the infection, introduced into the organism with the vaccine, were the cause of that pyemia; but not the vaccine which does not contain infectious germs.

He considered this case extremely rare, but he thinks it should be known, so that in the future one may avoid similar cases by strictly following the rules of asepsis; and he advises that the patients be rigorously examined before vaccinating them, because latent infectious foci can be revived; and the visual organs must be especially examined by an oculist. Besides an infection, a recurrence of an iridocyclitis can happen. Avoid them in people who are predisposed thru a persisting pathologic state. In this manner one can conceive that in the luetic, rheumatic, tubercular, or in anyone who may have had a generalized gonococcic infection, etc., ocular lesions can appear when a violent reaction happens.

Calhoun[4] published two observations in an article entitled "Anti-Typhoid Inoculations and Ocular Lesions." The first observation was in a lawyer with a slightly positive Neisser reaction, who presented a typical iritis the day following an injection of T. A. B. The other case was in a luetic with a + + + positive Wassermann. Three days after the third injection the vision blurred and the examination showed several deposits on the posterior wall of the cornea, opacity of the vitreous, and two patches of acute choroiditis. Salvarsan, mercury and iodides made the lesions disappear.

Prélat,[5] who published a case similar to the second of Calhoun, thinks it very questionable if the vaccine has a predisposing action. There are reasons why, in such a patient a plastic luetic iridocyclitis may develop, without it being necessary to resort to the antityphoid injection to explain genesis. Indeed, the luetic origin of double iridocyclitis not only seems to be possible, but certain, the antecedents, the clinical signs, the Wassermann, the favorable result that the treatment gave are positive proofs. It nullifies the hypothesis of direct action of the vaccine, but suggests that this may have played a coöperative part. On the other hand I find it very fair to bring to notice that, with the number of vaccinations which are given, it must be possible to meet one with some recurrences.

From his observations he finally deduces the following conclusions:

(1) The antityphoid vaccine in the luetic subject safe from any complications, does not seem to have any danger. If in these conditions some complications arise, it is not possible to make the injections responsible for the lesions. On the contrary, he considers it prudent, as de Lapersonne advises, to abstain from that practice in luetic and tubercular subjects, etc., who may have had lesions of the uveal tract, because they can be revived under the influence of the vaccine.

(2) Owing to the medico-legal consequences that might arise, in similar cases, the accidents that present themselves after the injections of T. A. B. must not be attributed to the vaccine until after a complete and minute examination of the patient; and it is not possible to accept this etiology without great circumspection and after a satisfactory verification. The observation of that patient is a proof of the necessity to judge such facts with extreme prudence.

The observations of Etienne Ginestous[6] belong to a circle of simple and tedious coincidences, because in the traumatism of an ocular globe, even in a very grave case like that which is the object of the first observation, it is usual to observe in practice momentary improvements, followed by rapid reactions which threaten the vision, or even produce amaurosis. This should not surprise [illegible], nor do we find this case exceptional. It concerns a shoemaker 19 years of age who, while playing, received a heavy blow on the right eye and lost the vision instantly. But on the following days he presented certain improvements even to the point of recovering one-fourth of his vision. On a day following an injection of T. A. B. he lost the sight again and he did not recover. Traumatic neuritis developed, nearing atrophy, an ordinary process in which it is not possible to account for direct influence of the vaccine.

The second case of the same author concerns a myope, with posterior staphyloma and chorioretinitis, vision with a $-5 = 2/3$. After a third injection, which caused fever and diarrhea, he noticed that his vision diminished to 1/6, after correction. We remember that the lesions of the retina of the myope can progress and the visual acuity diminish, even after the defect was corrected; and that at a certain moment, without the apparent determinating cause, a rapid diminution of vision occur. One must consider the immense number of myopes inoculated with T. A. B., and none of them complaining of poor vision after vaccination, and we also note that many myopes, without receiving any inoculations, suffer diminution of vision.

Other troubles have been observed, such as lesions of the retina (Morax), ocular motor nerve paralysis (Morax and Bourdier), whose etiology is most questionable, as it concerns luetics or patients whose luetic records have not been investigated. Morax himself admits that it is a question of coincidences, such as happens in the two observations of Ginestous. In résumé: It is a question of late consequences, of known processes which in their evolution do not diverge at all from the usual, and therefore do not seem influenced at all by the antityphoid vaccine.

So far there have not been published any cases of retrobulbar neuritis. De Lapersonne would explain them by a meningeal reaction of the sheath of the optic nerve. Of the same nature would be the lesions of the optic tracts and also those of the motor nerves.

He advises extreme prudence and really admits the action of the vaccine only in those cases in which the different clinical and laboratory examinations, and very particularly the reaction of Wassermann, have been negative.

It is necessary to differentiate the glaucomas. Is it a question of glaucoma secondary to old irido-cyclitis, with pupillar occlusion? Nothing is more easy than to think of an acute attack developed during a violent reaction.

The explanation of the acute and subacute glaucoma is much more embarrassing; and it would be really difficult in this case to deny the influence of the vaccine or to explain the process of a chronic glaucoma whose pathology is far from being clear, the manner in which the vaccine could aggravate it is not evident, above all when the aggravation is late, more than one month, and a febrile access did not follow the injections.

So far our knowledge of ocular lesions consecutive to injections of antityphoid vaccine is limited; but as conclusions one could establish the following propositions, which, with some exceptions, are the views of the majority of the authors referred to.

1. There exists no ocular lesion depending directly and exclusively upon the antityphoid vaccine.

2. Herpes febrilis of the cornea is the ocular lesion which is admittedly dependent upon antityphoid vaccine; but in certain cases, as in our observation, it dealt with a recurrence, and one must admit a predisposition.

3. In a like manner, the cases of iridocyclitis which have a constitutional defect must be considered. A reaction of the vaccine can bring on secondary glaucoma depending upon iridocyclitis.

4. Pyemia, whose cause is a fault of asepsis in the technic, can produce grave complications of metastatic purulent iridocyclitis.

5. Certain lesions of the optic nerves, the optic tracts and certain ocular paralyses, of which, so far, no observations have been published, could be explained by meningeal reaction.

6. An acute primary glaucoma can develop during the reaction of the vaccine. It is not possible scientifically to express in what manner a chronic glaucoma would be aggravated.

7. To admit the action of the vaccine, it is necessary that the ocular manifestations should present themselves during the febrile reaction or immediately after.

8. In certain cases it is not possible to attribute to the vaccine any action at all, it is simply a question of annoying coincidences.

9. It is not prudent to vaccinate luetic, tubercular, and rheumatic subjects, etc., who may have previously had lesions of the uveal tract.

10. There is no reason to deprive those subjects of the benefits of the vaccine who had no former lesions of the uveal tract; who are exempt, therefore, from all former ocular affections.

11. The patient must be submitted to a previous medical examination, and the examination of the eyes entrusted to an oculist.

12. Before judging on a medicolegal matter, due to the vaccine, it is necessary to use great circumspection and to have a perfect knowledge of all that has been said on the subject.

BIBLIOGRAPHY.

1. Morax. Annales d'Oculistique, May, 1916.
2. Gloagen. Annales d'Oculistique, Jan., 1917.
3. de Lapersonne. Archives d'Ophtalmologie, March, 1917.
4. Calhoun. Ophthalmic Record, Nov., 1917.
5. Prelat. Archives d'Ophtalmologie, Nov., 1917.
6. Ginestous. Paris Méd., Feb., 1917.

THE EFFECTS OF FAULTY CRANIO-SPINAL FORM AND ALIGNMENT UPON THE EYES.

LLOYD MILLS, M. D., F. A. C. S.

LOS ANGELES, CALIFORNIA.

Faulty posture of the head and spinal curvature are generally recognized as effects of ocular anomalies. This paper points out the reverse relation may be true, and the ocular symptoms relieved by orthopedic treatment.

Tilting of the head, high-headedness and its converse have long been recognized as products of, or have been found in such constant relation to the various heterophorias and heterotropias, notably the cyclophorias, as to fix the opinion that the cause of the ocular misplacements and torsion, and consequently of the cranial malposition. was primarily a fault of action of the extrinsic ocular muscles and particularly of the obliques.

Spectacular cures of marked torticollis, effected by operating upon these muscles in a few cases, further so emphasized this opinion, that the possibility of faulty cranial posture, as a primary result of marked cranial asymmetry, or secondary to faults of spinal alignment or of actual vertebral lesions. acting to produce ocular torsion and changed corneal curvature thru compensatory overaction of certain groups of extrinsic ocular muscles in their effort to achieve and maintain normal spatial orientation, apparently never were considered.

Prior to the inception of our work in August 1915, ophthalmic and orthopedic literatures were barren of facts dealing with such an association. In fact the ophthalmologist limited his notions of ocular mechanics to the orbit, while the orthopedist rarely went above the seventh cervical vertebra, from which point he usually dropped a plumb line in spinal examinations.

Our interest in this problem arose from having seen projectile wounds of the cervico-dorsal spine with frank ocular symptoms; from a case of acute glaucoma in which the first symptom, acute cutting pain in the cervico-dorsal region, was so agonizing as to mask the ocular lesion, or symptom, temporarily; from observing that obvious and gross skeletal deformity seemed more prevalent among cases of manifest squint than among ordinary eye cases and, finally, from noting that the suboccipital and nuchal aching which accompanied many of the more marked refractive and muscular faults very often did not yield to the most accurately prescribed lenses or to muscle training, but were often temporarily relieved by cervical massage or manipulation.

A chance discussion of some of these facts with Dr. Charles L. Lowman, a capable orthopedic surgeon, revealed the fact that he had noted improvement or relief of eye symptoms in patients coming to him for such remote static lesions as flat foot, hip disease and, more frequently, cervico-dorsal lesions. "Pulling," "drawing" or "burning" sensations in the neck and back were common complaints among the last class, and were more pronounced during or after sewing, reading, writing, typing or watching moving-pictures, activities which require stabilization of the head, or shoulder-girdle fixation (essential to the use of the hands in any finely coordinated work) or both, as an essential to intense ocular fixation, thus putting strain on all the muscular and ligamentous attachments and structures involved in maintaining head balance and in fixing the shoulder-girdle.

We knew that only about ten per cent of all individuals could be classed, posturally, as belonging to the "ideally normal type." It was estimated that emmetropia and normal muscle balance existed in about an equal per cent of individuals and the parallelism seemed suggestive. Further, lateral and antero-posterior deformities of the spine are very common, anatomic peculiarities are frequent in the cervical region and cranial asymmetry is the rule.

It seemed logical to assume, therefore, that not only could spinal curves and rotations be evolved compensatorily in the mechanics of balancing unequally weighted cranial halves upon the spine, but also that faults of cranial posture, such as tilting and high-headedness, could be the compensatory postural result of spinal bends and torsions due to unilateral leg deformities and faults in pelvic alignment, as well as to original lesions of the spine. We assumed, further, that the eyes could be involved in these skeletal defects; first thru reflex irritation, stretching or pressure upon the cilio-spinal sympathetic center and pathways, a relation to be detailed in a subsequent paper (American Encyclopedia of Ophthalmology, Vol. XV, *Spinal Affections*); and secondly thru compensatory action of the extrinsic ocular muscles producing compensatory heterophorias and heterotropias and presumably changing the corneal curvature by their novel and unequal efforts to put and to keep the world right side up.

We believed it logical to hold that certain ocular muscles might become shortened by adaptation, in the same manner that the peronei in the leg shorten when the internal muscles stretch and let down under the increase weight caused by a disturbed line of gravity and that there was no reason why a tilted pelvis, for instance, should not produce compensatory changes in the eye structures as it will in foot structures.

On these assumptions several hundred consecutive eye cases were contrasted with the consecutive cases of postural defects appearing at the Crippled Children's Guild. In the former group, naturally, nothing like a full orthopedic examination, with the patient stripped, was possible. At first merely the binocular and monocular ductions were taken, together with the usual refractive findings, but later the fixing eye for distance and near was determined, the ocular torsions, the gross features of cranial and facial asymmetry were observed, as well as the location of a plumb line passing thru the external occipital protuberance and the position and degree of head-tilting, rotations and other cranial malpositions.

It was quickly found that among the cases which were without doubt primarily orthopedic, such as infantile paralysis, hip disease, tubercular disease of the spine etc., gross ocular muscle defects and irregular astigmatism, of notable degree, occurred in the proportion of about 3.2:1, when compared with the consecutive eye cases, the comparable cases among which, almost without exception were frankly out of skeletal alignment. A standard of over 3 degrees of left or right hyperphoria, of over 3 degrees of exophoria or esophoria, exophoria for near of 10 or more degrees and esophoria for near of any degree were taken as an empirical but practical basis for comparison. Left hyperphoria occurred in 72 per cent of the orthopedic cases and 61.5 per cent of the eye cases; and the characteristic ocular imbalance associated with the obvious postural imbalance was that of left hyperphoria; exophoria for distance and increased exophoria for near, due to weakness of the left internus, the right eye fixing both for distance and near, the left diverging at near, and the left eye showing torsion or cyclophoria. In the eye group it was seen that the great majority of patients complaining of suboccipital or cervical or brachial pains showed more or less obvious postural faults and a muscle balance corresponding to that of the characteristic orthopedic case. Every case of hyperphoria above five degrees in both groups showed more complicated head tilting and rotation, more obliquity of the shoulder-girdle and more marked spinal curves and rotations, than were to be found in the cases of lesser ocular inbalance.

Our first conclusions from the work begun in 1915 were reached in 1917. Orthopedic results in cases of serious deformities are obtained thru patient muscular, ligamentous and nervous reeducation, and when our results appeared sufficiently suggestive to warrant publication, as well as to establish priority, Dr. Lowman, in February 1918, submitted the main orthopedic fiindings and the hypotheses then reached, in the form of a candidate's thesis to the Committee on Membership of the National Orthopedic Association. This paper appeared in the American Journal of Orthopedic Surgery, Dec. 1918, p. 459-492 with the title "The Effect of Faulty Skeletal Alignment Upon the Eyes."

Risley (Amer. Jour. of Ophthal., May 1918, p. 357) is reported to have made a study of a number of cases of decided cranial and facial asymmetry. Hatters forms were made of many of these and the grotesque distortion which these forms showed was frequently coincident with such marked facial asymmetry as a relatively flat or even concave zygoma on one side paired with a large convex one on the other, and with much variation in the distance of the eye from the median plane. This variation of the location of the eyes in the orbit, in the form of the globe, in the length, line of direction and point of origin and insertion of the extrinsic ocular muscles were considered by Risley to be large factors in producing the refractive defects and muscular imbalances noted in these cases. Risley made no observation of associated postural defects of cranio-spinal alignment.

Stevens (N. Y. Med. Jour., Aug. 17, 1918), writing on "Right Handedness in Its Relation to Visual Conditions," correctly interprets the unsymmetric shape of the skull as the direct effect of the over development of the motor area of the left cerebrum to correspond with the racial prevalence of dextrality. In infancy there is bilaterality of cortical movements which wrongfully undergo suppression in the infantile period as the result of prevalent racial training. Repeated examinations show that the cranial asymmetry which results produces a distortion of the left orbit, the upper arch of which is pushed out, thus changing the axis of the cavity and, as measured by the clinoscope, leading to a left cyclophoria, a fact wholly in accord with our clinical findings. In some cases Stevens noted a right cyclophoria or a cyclophoria of each eye, and finds that such deviations usually occur in the left handed or ambidextrous; or in those who were left handed or ambidextrous when young, but whose natural and instinctive manuality had been forced into dextrality to accord with popular opinion and action. Stevens accurately concludes that the lack of symmetry of ocular position associated with the cranial asymmetry, leads naturally to imperfect symmetry of action and to imperfections of binocular vision. He finally urges that ambidexterity be encouraged, a conclusion which, in our opinion, ought to be broadcasted with epigrams to the effect that "An unequal brain development makes an uneven mind" by which the idea may be popularized. Stevens made no observation of associated cranio-spinal alignment.

Verwey (Amer. Jour. of Ophthal., Sept. 1918, p. 677) reports the correction of heterophorias of low degree thru inclinations of the head.

De Kleijn (Archives neerlandaises de Physiologie, tome 11, p. 644, 1918) shows that in the rabbit, alterations in the posture of the neck, especially of the two upper segments, provoke and maintain definite posture of the eyeballs. From the experiments, accomplished by extirpating the otic labyrinths, Sherrington (Brain, London, Nov. 1918, p. 332-343), in a masterly deductive paper on "Observations on the Sensual Role of the Proprioceptive Nerve Supply of the Extrinsic Ocular Muscles," reaches the conclusions that "sensory impressions of the neck posture have probably to be added to the factors implicated in visual imperceptions of orientation as regards verticality and inclinations thereto," the other factors concerned in spatial orientation being; 1, the retinal proprioceptive; 2, the muscular sense derived from the proprioceptive nerve supply of the extrinsic ocular muscles; and 3, otic labyrinthism. Sherrington emphasizes the fact that spatial perceptions are by no means purely visual but are rather "visuo-musculo-labyrinthine," the afferent nerve fibers in the extrinsic ocular muscles yielding sensory impressions which are the basis of perception of postures and movements and which aid the proprioceptive nerves of the rest of the body, and especially those of the "gravitational labyrinth" in registering the attitude of the whole body and its relation or orientation to the vertical.

The logical practical deduction from Sherrington's work, which we feel justified in making in view of the abundance of our clinical proof, is that when one leg of this proprioceptive quadrangle is defective the others take up the increased burden of maintaining or attempting to maintain normal spatial orientation, or yield under the added effort. Thus an altered state of the muscles supporting the shoulder-girdle, neck and head, by deviating the head from verticality, may produce an altered static state of the extrinsic muscles of the eyeball, which causes altered muscular sensation in maintaining the eyeballs in their new postures. We believe that this altered sensation may evidence itself in any leg of the quadrangle by symptoms such as actual visual (retinal) tire, muscular imbalance, or actual equilibrial (otic) disorder.

The stimuli which evoke compensatory muscular action and altered sensation in the extrinsic ocular muscles appear to be both gravitational and visual (retinal), and represent an attempt to keep the world right side up and in line with visual perspective realized as correct thru prior experiences. The converse deduction may explain the difficulties evoked by the correction of gross refractive defects for the first time late in life. Here both muscle sense and visual sense have long united in the assumption that their faulty muscle pulls and imperfect vision were normal and their reeducation to a realization of normal orientation is often impossible.

Returning to the question of the origin of many of these deviations from normal: The racial training which assumes, erroneously, that dextrality rather than the inborn state of ambidexterity is the correct state of man, causes the relative enlargement of the motor area in the left hemisphere. This occurs during the plastic years of the infantile period when there is no bar to the consequent enlargement of the left side of the cranium which, in being more capacious than the right, and heavier of content, leads to asymmetry of the orbits, of the face, of the position of the eyes in the orbits and of the muscular distribution and action, the last being partly the result of the orbital asymmetry and partly the result of faults of spinal and hence of general posture.

For purposes of skeletal mechanics the skull must be considered as a terminal vertebra whose unevenly distributed weight is superimposed upon the atlas and axis and to balance which there has commonly been developed a long total left lateral spinal curvature which is as normal to all dextrous individuals as the corresponding long right total postural curve is to the sinistrous. In scoliosis studies the more common of these curves, the "total left postural" or "functional" curvature has been considered merely as an uncompensated curve due to relaxation, habit, overweighting, etc.; whereas, in fact we have what should be classed as a right cranio-cervical, left dorso-lumbar curvature, in strict orthopedic nomenclature.

Where there is bodily symmetry, or where all the forces making for asymmetry balance, the result is a vertical orthophoria, it being assumed in this entire consideration that no pathologic conditions as nasal sinus disease and no truly congenital anomalies exist to complicate the situation.

The lateral muscular balance we consider in the main the result of cranial, orbital and facial asymmetry as affecting the relative positions and musculature of the eyes and there is no doubt, from our demonstrations of complete ocular muscular readjustments to normal of lateral imbalances following spinal realignment, that cranial posture with regard to verticality, whether purely of spinal or of cranial origin, or the product of both, is the activating factor in this, as in most ocular imbalance.

The relation of the shoulder-girdle to these problems is both close and interesting. The shoulder-girdle may be considered for purposes of the mechanics involved, as being slung from the neck and occiput by the trapezius and the deeper muscles, these muscles fixing the girdle in all finely coordinated work of the hands and arms, fixing the neck during all visual concentration, and being concerned in the sensory impressions of neck posture as regards to verticality. In the dextrous the greater weight of the right shoulder and arm causes this to sag, drooping the right side of the shoulder-girdle. The left shoulder rises correspondingly, while the head tilts or rotates (uncomplicated tilting is almost unknown) to produce a left hyperphoria or, if the tilting exactly compensates for the shoulder-girdle alteration, a vertical orthophoria. Hence the vertical ocular balance must be considered the product of the cranio-spinal curves and the shoulder-girdle position, according to the presence and degree of dextrality or sinistrality.

Other factors modify or complicate this common relation such as the faulty head postures which are beyond question the result of intrinsic heterophorias, if such a term may be coined to identify those due to muscular defects inherent in the position, distribution and action of the extrinsic ocular muscles by virtue of congenital or occupational faults, as opposed to the heterophorias which are demonstrably the result of original faults of skeletal posture. Among such skeletal changes we find those due to unilateral leg deformities and faults in pelvic alignment, and the various spinal deformities associated with faulty postural habits or the results of spinal pathology. In not every such case, however, are ocular anomalies found, as in the case of a woman of 47 with tubercular disease of the right hip dating from childhood, who wore a shoe raised two inches, but whose spinal curvature caused by the unequal length of the legs, was fully compensated by this shoe, by other curves above and by a head tilt which yielded a vertical and lateral orthophoria as the sum of all the forces.

In a large series of orthopedic cases under treatment, correct shoeing, corseting, bracing, massage, spinal manipulation, hydrotherapy, head suspension and gymnastics, led in a few months to several years, to a correction or beneficial modification of low degrees of muscle imbalance of all sorts, as well as to a lessening of astigmatism in some cases and to its complete cure in five.

The largest class of patients whose symptoms have previously been most distressing and most discouraging, because hitherto almost unrelievable, is that showing from 2 to 6 degrees of exophoria at distance, exophoria for near of from 9 to over 20 and usually variable, adduction equal to or often less than abduction, frontal, suboccipital and nuchal aching, provoked by close work and usually worse the following day, soreness at various points along the spine and with an increase in general nervous symptoms which has long since, unhappily, placed this large and important group of cases among the psychasthenics. Some of these cases have little or no refractive error, tho the majority show compound hyperopic astigmatism of moderate to considerable degree. Excluding amblyopia ex anopsia and visual disparity due to accidents, the right eye is, for the most part, the fixing eye both for distance and for near, the left eye diverges when test objects are brought near, the left eye is the higher, and its axis is tilted (cyclophoria, or the positive declination of Stevens), all of these being in line with the observations previously noted in connection with structural faults of the left orbit, of the musculature of the left eye and of general cranio-spinal asymmetry. A careful orthopedic examination shows that, with hardly an exception, these cases occur in connection with abnormal spinal twists and rotations, especially cervico-thoracic, with irregular and painful impingements of normal or of abnormally broad lateral processes, with overlapping impingements of the posterior spinous processes in cervical lordosis, with arthritic enlargements of the articulations, fibrositis and periarticular thickenings due to ligamentous strain and trauma, cervical ribs, etc. Nearly all of these cases show muscular spasm and soreness, over the points of muscular and ligamentous insertion which are being unduly stretched as the effect of faulty skeletal alignment. A common fault is the lateral bending with rotation which occurs in scoliosis, where lateral and antero-posterior deviations of the shoulder-girdle exist with so much stretching of the brachial plexus as to cause brachial pain and incorrectly termed "brachial neuritis." The ocular disturbance so often associated is probably partly due to the reflex effect continuously produced in the cervical sympathetic.

In most of these cases the true relation between cause and effect is clearly shown by the more or less prompt relief to nervous, spinal and ocular symptoms which follows corrective orthopedic measures. In many cases where the abduction is weak the relief is distinctly accelerated by appropriate prism exercises, fixation exercises for improving the near balance, graduated reading and careful visual hygiene. In a few cases complete relief has not been obtained from these corrective measures. Possibly here the general postural asymmetry is excessive, and the uneven cranial weight and the uneven shoulder weight and action combine with occupational habits to maintain the postural fault to a degree.

Two practical points of ocular hygiene arise from this investigation: 1. In the cases which develop symptoms referred to the neck on close ocular fixation, attention should be given to correct seating, and to such cranio-cervical support and consequent relaxation that contraction of the erector spinae group cannot be maintained stiffly or, at least can be minimized. 2. In those cases where occupation demands ocular fixation combined with intense shoulder-girdle fixation, such as in sewing, reading and typing and especially when without arm support, the symptoms are often induced more by the weight of the hands, forearms and arms dragging upon the trapezius and keeping it contracted, than by the process of shoulder-girdle fixation alone. Here again the relief can be obtained by relaxation gained by correct seating, correct posture, by voluntary relaxation of the back and neck and especially by providing chairs with arms to relieve the shoulder-girdle of the pendant weight. Herein also lies the great value of the reading stand or rack which allows complete shoulder-girdle relaxation and permits the reader, as well, to assume a completely relaxed posture of head and spine.

The writer presents this elementary work, with all of its obvious imperfections, in the belief that a new point of attack and a means of prevention are shown against conditions, the persistence of which has been a source of discredit to ophthalmology, no less than to medicine as a whole.

Finally, the assistance and inspiration of Dr. Charles L. Lowman in this work are hereby acknowledged.

CONCLUSIONS: 1. We have established the first practical therapeutic connection, if not the first postural connection, between cranial asymmetry and spinal curvature.

2. We have made the first demonstrations that the common faults of head position, hitherto ascribed solely to faults of action and distribution of the extrinsic ocular muscles, often may be due to structural skeletal faults original in the lower extremities or spine; which affect the eyes thru their influence upon head posture, as well as thru their effect upon the cilio-spinal sympathetic center and the sympathetic pathways.

3. For the purpose of skeletal mechanics the head must be considered as a great terminal vertebra which assumes compensatory postures in the case of postural defects original in the extremities and spine, and gravitational postures due to its own imbalance on the spine, unless fully balanced by compensatory spinal curves.

4. Excluding conditions orginating from diseases, the basic skeletal faults

deemed responsible for many functional defects in the eyes and nose and, for much ocular and cranial pathology, are those arising from asymmetry of the cranium in connection with the racial prevalence of right handedness and the less common left handedness. From this asymmetry spring orbital distortions, and alterations in the positions, muscular distribution and muscular actions of the eyes, the left eye being mainly affected thru its proximity to the larger left cerebral hemisphere and the large left cranial fossae, and left hyperphoria, cyclophoria and left adductor weakness being the common muscular defects. From this common origin come also asymmetry of the facial bones, of the shape, position and ease of drainage of the nasal sinuses, and faults of the bony and cartilaginous septum, of the hard palate, the jaws and teeth.

5. To balance the unsymmetrically placed weight of the head on the spine long, lateral, compensatory curves of the spine are developed. These are exaggerated or further complicated by the effect of dextrality or of sinistrality in uncompensated shoulder-girdle deviations, which induce further changes in the posture of the head, thus neutralizing or exaggerating the cranial posture which would otherwise have resulted.

6. These faults of cranial posture influence the proprioceptive functions of the extrinsic ocular muscles, the retina and the muscles of the neck, and undoubtedly put more strain upon the labyrinthine mechanism in their efforts to readjust the ocular position with regard to verticality, or spatial orientation.

7. Stabilization of the head on the neck and shoulders is almost as essential to all intense and prolonged ocular fixation as the more limited action of the extrinsic ocular muscles. Stabilization of the shoulder-girdle is equally an essential, when finely coordinated manual work is the object of the ocular attention. Strains of this stabilizing system thru its overuse, and especially in the presence of spinal faults and uncompensated shoulder-girdle deviations, produce the distressing suboccipital, cervical and brachial symptoms incident to reading and to many occupations.

8. Severe ocular imbalance is found more commonly among cases which are primarily orthopedic than among average eye cases. Cranio-spinal postural defects are found almost uniformly in the eye cases complaining of suboccipital and nuchal aching and are, in the main, capable of relief or cure by methods of relaxation and by appropriate orthopedic and ophthalmic procedure. As a result of such treatment we have noted the lessening and disappearance of ocular muscle imbalance and, in a few cases, the lessening or disappearance of corneal astigmatism. (Our original investigation was limited to the relation of postural and eye-muscle defects; and it is likely that complete comparisons of the corneal astigmatism before and after alignment would have given a much higher number showing astigmatic changes.)

9. The logical applications of our work to preventative medicine are, (a) Ambidexterity must be insisted upon during the infantile period and the plastic, developmental years. This will produce not only the symmetric development of the cerebral hemispheres, but is the means of symmetric development of the cranium and of the superficial and deep components of the face. In this way developmental malpositions of the orbits, the eyes, the nasal cavities, jaws, teeth and spine will be prevented and the pathology which has its foundation in these early defects will be avoided.

(b) The prevention of ocular faults resulting from faulty spinal alignment lies, obviously, in the early recognition of the spinal defects by the pediatrist and by those responsible for our school hygiene, and in their cure in youth by the orthopedic surgeon.

THE CONTROL OF TRACHOMA AMONG THE ALIEN LABOR COMPANIES OF THE BRITISH AND AMERICAN EXPEDITIONARY FORCES

GEORGE S. DERBY, M. D., F. A. C. S.

BOSTON, MASS.

As Lieut.-Col. and Assistant Ophthalmic Consultant of the American Expeditionary Forces, Dr. Derby had to deal with the problem of trachoma. He here describes the classification, segregation, and treatment of the infected men. Presented to the Section on Ophthalmology, American Medical Association, June 11th, 1919.

Civilian labor was employed to a very considerable extent in France by the French, British and American forces. In many instances, these laborers were drawn from races in which trachoma is a common disease, and a large number of the individual laborers were themselves infected.

The history of the spread of trachoma among the armies of the various nations, before proper methods of control were in force, is well known. A few figures taken from Eason's article read at the 1918 meeting of the Ophthalmological Society of the United Kingdom may be given here. On the invalid list of the British Army during 1818 were more than 5,000 soldiers rendered blind by trachoma. From 1813 to 1817, from 20,000 to 30,000 men of the Prussian Army were affected. From 1816 to 1839, over 76,000 men in the Russian Army were trachomatous. A Belgian Army was disbanded because the disease was so prevalent and spread infection thereby thruout the civilian population.

The introduction of alien labor companies into France, in some of which trachoma was prevalent, brought a certain amount of danger to the civilian population and to the armies themselves. It was my fortune, while stationed with the B. E. F., in 1917 and part of 1918, to have an opportunity to study the British system of trachoma control and to take a small part in some of their work. Later, the task of inspecting the labor companies in the American Expeditionary Forces for trachoma was assigned to me, and as our plans for this work were modeled entirely on the system so admirably carried out by the British, I may be permitted to give a rather full description of their work.

BRITISH EXPEDITIONARY FORCES.

In the spring of 1917, the disease was noted among the Egyptians and Chinese to a considerable extent, and it was decided, after a consultation held between Colonel W. T. Lister and Major J. F. Cunningham of the Ophthalmic Consulting Service with the various army authorities interested, that a complete examination of these nationalities should be made. Orders were immediately sent out to the effect that "no cases with definite trachoma granulations or acute conjunctivitis be allowed to embark from Egypt or China or disembark in this country." Of several thousand Egyptians it was found that 19 per cent had active trachoma, and a serious problem arose as to the handling of them. They had been enlisted in groups in Egypt, each group under its own headman, and they could not be separated from him. Luckily, their stay in France was to be a short one, and therefore the measures employed in general were segregation, disinfection and treatment in each company.

The main problem was among the Chinese, for they came to stay and in large numbers,—over 100,000. There was some difficulty at first, as companies had been sent out in which a certain number of trachoma and conjunctivitis cases were mixed in with the clean men. As time went on, however, and the system became established, it was possible to remove the infected ones from these companies and to replace them.

Under the energetic guidance of Colonel Lister, the Ophthalmic Consultant, and of Major J. F. Cunningham, a most excellent system was established and began to work in July, 1917. On the arrival of each shipload of men at Chinese headquarters, in addition to a general examination each man had to have his lids turned and inspected. These inspections were carried out by men familiar with the disease. If the lids were healthy and there was no conjunctivitis, the man was placed in a clean or "X Company." When conjunctivitis was discovered and no evidence of trachoma, the man was placed in a conjunctivitis or "Y Company." Trachoma cases were put in trachoma or "Z Companies." Doubtful cases of trachoma were usually placed in the "Y Companies." These labor companies were usually formed of 500 men, and were sent out from headquarters to the various areas where labor was required.

Clean companies, under medical officers without ophthalmic experience, could be sent anywhere, so long as provision was made for occasional inspections by ophthalmic specialists. These inspections were necessary, for although directions had been sent to China not to embark infected men, yet, owing to the difficulties of obtaining coolies entirely free from the disease, a certain number of trachomatous cases came over with practically every shipment, tho the number showed a very satisfactory diminution as time went on. It was impossible to hold clean men at headquarters for a sufficient length of time to rule out contagion, and therefore it was to be expected that trachoma would appear from time to time in the clean companies, as it did, since all these men were contact cases.

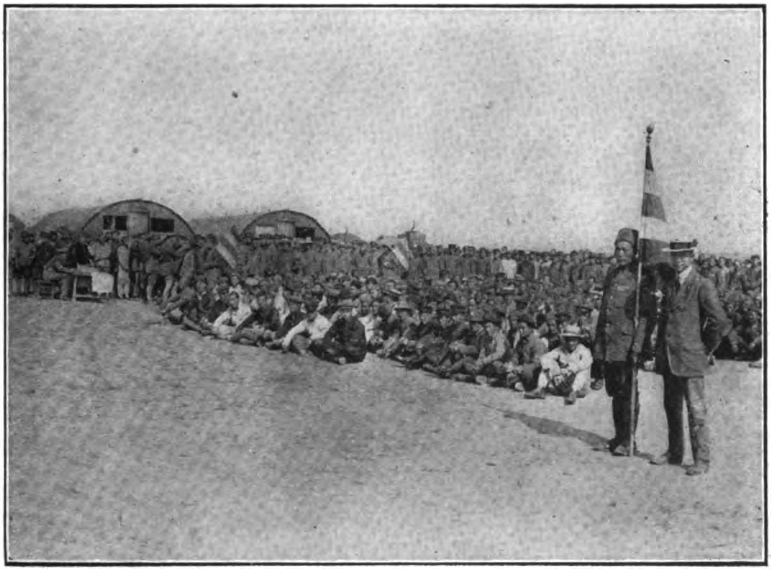


Fig. 1. Labor company in France drawn up for inspection.

The Y and Z cases were sent to places designated as "Trachoma Treatment Centers," where they were under the supervision and care of an ophthalmologist.

Examination carried out at Chinese Headquarters over a period of nine months showed that 5.04 per cent of the Chinese arriving had active trachoma, while 13.49 per cent had conjunctivitis, and many of these latter were well on their way to recovery from treatment received before they were sent out, and it was possible to place them in clean companies. The trachoma figures did not include a number of the early companies in which the percentage of disease was large. Colonel Lister's figures in a report sent in a few months ago show, among 100,000 Chinese, approximately 8,500 cases of acute infectious trachoma and 5,500 cases of suspicious conjunctivitis.

Inspections of companies in the field were carried out by Colonel Lister and his assistants at frequent intervals, care being taken to examine the men at a time when it would interfere with labor as little as possible. Owing to the central location of Colonel Lister's headquarters (Boulogne) in relation to the British front, it was possible to examine a number of companies on a single day if the schedule was well planned. The Chinese were lined up in three or four files, according to whether three or four officers were to make the inspection, and came up in turn for the examination. Behind the examining officers sat the recorder at a table. Clean cases were immediately passed. If a conjunctivitis or trachoma case was detected, the man was detained by a non-commissioned officer, his number ascertained from his identity disk or wrist band, and it was recorded in the appropriate column of the recorder's book. The number examined was also recorded, so that there was a permanent record of all cases of disease and the men could be transferred to their proper companies. One copy of the record was left with the company. Under the system adopted, these examinations were carried out with great speed. With three medical officers examining 500 men could be gone over in 25 to 30 minutes.

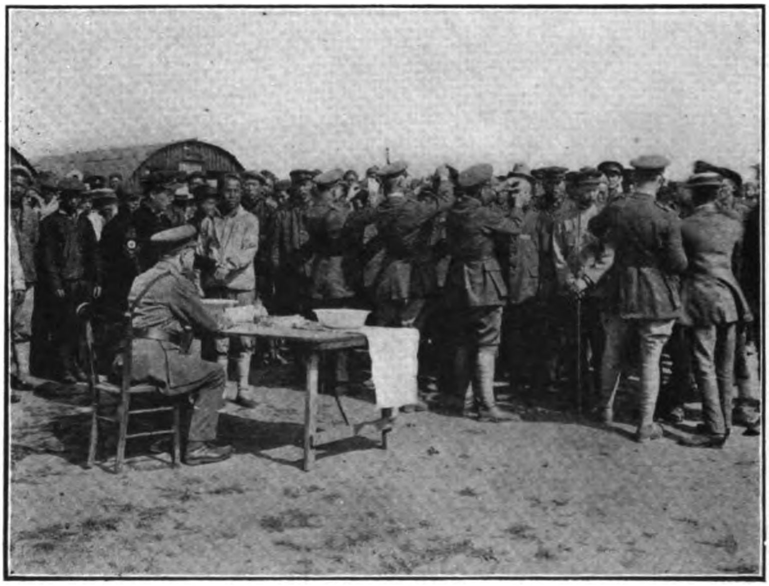


Fig. 2. Method of inspecting the eyes for trachoma, four officers inspecting, recorder taking number of man found infected.

Treatment—As the Chinaman is prone to develop conjunctivitis, especially if working in a dusty atmosphere, Coloned Lister instituted the so-called "Universal Drops" treatment for the clean companies. This consisted in dropping a solution of zinc sulphat and boric acid into the eyes of each man once a day, preferably after returning from work. The men were taught to squat down in two long rows facing each other and to draw down the lower lids with the fingers. A Chinese medical orderly passed down in front of each one and instilled the drops. He was assisted by a man who passed behind the row and steadied the head of each individual. As each row was treated, it was replaced by another, and the whole company was finished in about twenty minutes. The milder cases in the Conjunctivitis (Y) Companies were treated in the same way. In severe cases the lids were painted with silver nitrat or protargol.

Trachoma (Z) Companies had the treatment appropriate for each case—expression, silver nitrat, or the copper stick. Corneal ulcers were treated as in civil practice. An important factor in the limitation of the spread of this disease was regular sterilization of the Chinaman's towel twice a week.

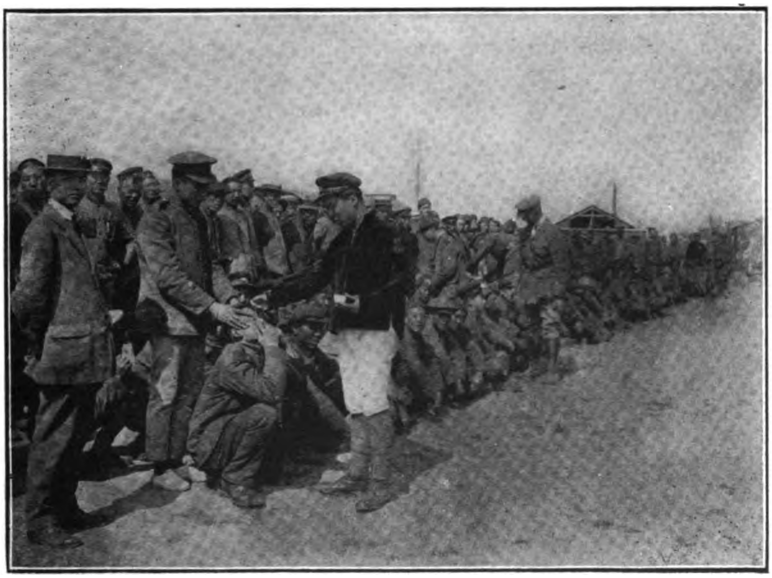


Fig. 3. Men lined up to receive treatment for conjunctivitis and trachoma.

By the procedure described it was not expected that these laborers would be cured of their trachoma, but it was expected that the spread of the disease would be limited, and that their working efficiency would be raised to the highest point practicable. I believe that these ends were accomplished. Trachoma if untreated leads to a loss of working power.

To quote from Colonel Lister's report: "The first examination of two (of the earlier) companies revealed 12 cases in one and 15 in the other. Owing to the importance of the disease not being recognized by the authorities, the treatment advised was not carried out and the notified cases of trachoma were not moved. In eight week's time there were 59 cases in one company and 81 in the other."

"A trachoma company was sent up to an army area for about six weeks and was untreated. At the end of this time the average number of men off duty daily for eye trouble was 30, and 15 men had been sent down to Headquarters as unfit to work."

This last company was sent down to the Base and was put under the treatment of Captain Hine, Ophthalmic Specialist at Camiers, with whom I saw them in October, 1917. Out of 588 men, 68 needed expression. From 30 off duty daily in October, the number fell under proper treatment to 7 in December and 2 in January. In two other companies the number off duty fell in four months from twenty-five to none.

No case came to notice of the disease having spread either to the civilian population or to troops. The Controller of Labor has stated that the men off duty in the affected companies was no greater than in the unaffected companies. Not more than two or three patients a month were sent back to Chinese Headquarters as unfit to work.

A system of ophthalmic reports was instituted giving the essential facts as to eye disease in each company, including the number of men off duty daily for eye disease. By a glance at these cards it was possible to see which companies were in need of attention. A system was also instituted by which the various areas of the British Expeditionary Force were divided so that sufficient inspections could be made.

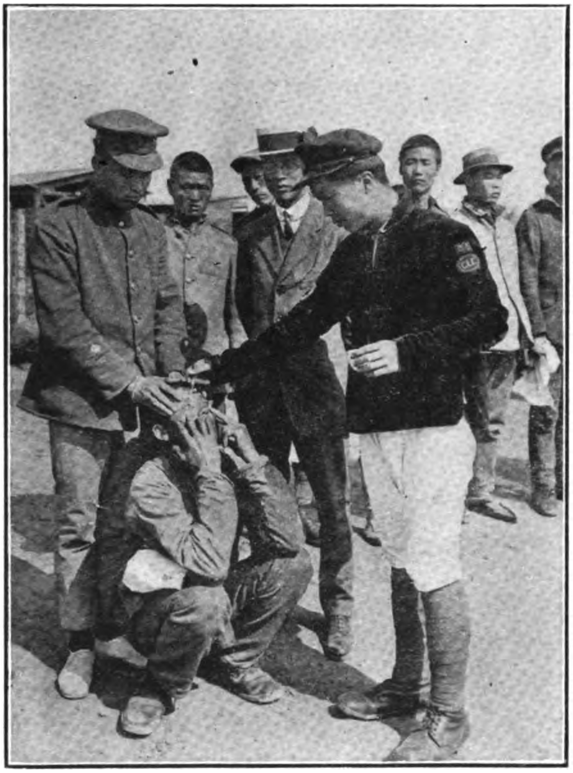


Fig. 4. Method of instilling drops while assistant steadies the head.

American Expeditionary Forces.—In July, 1918 the Division of Ophthalmology of the American Expeditionary Force was asked by the Medical Division of the Labor Bureau to make an inspection of the administrative labor companies, with a view to ascertaining the amount of trachoma existing and to suggest any necesary measures for its control. This duty was assigned to me by Leuitenant-Colonel Greenwood, the Senior Ophthalmic Consultant. A conference was held in Paris with Major W. H. Honor, the Chief of the Medical Division of the Labor Bureau, who, like myself, had served with the British Expeditionary Force and was familiar with the British trachoma problem and the way in which it had been handled. We agreed that our work should be carried out along the same general lines, but adapted to the special conditions which existed in the American Expeditionary Force.

We had in the neighborhood of 180 companies to be inspected, scattered over the whole area of France occupied by the American Expeditionary Force, from the aerodromes close to the front, back to Bordeaux and the other Base Ports. The companies were all taken over from the French, who organized them, and were all inspected by the French for contagious eye disease at the various centers at which they were gathered together. Their disciplinary control was in the hands of the French, a fact which created difficulty in a number of instances. Racially, they could be divided into Chinese, Indo-Chinese, North Africans and mixed. The North Africans were composed of several different races—Moroccans, Algerians, Tunisians, etc. There were French Companies, Spanish Companies, many Portugese and other nationalities, but these for convenience we classified as mixed.

The work of inspecting the companies in the advance zone began on August 7. In general, the companies were notified several days in advance that an inspection would be made at a certain hour. The hour was chosen so as to interfere as little as possible with the labor of the company. In some cases the companies were examined on Saturday afternoon after working hours, and in some cases on Sundays. In certain instances, inspections were held before the men went to work or after returning from work, during the period when the light of the summer season permitted. In the majority of cases, the work was done either just before or after the noon meal. There was no uniform schedule of labor for these companies. Some did not work the latter part of Saturday afternoon and some did not work on Sunday, and it was difficult to hold them for examination outside of their working hours. Inspections were, (in all but two instances) carried out by me, usually with one assistant, sometimes more.

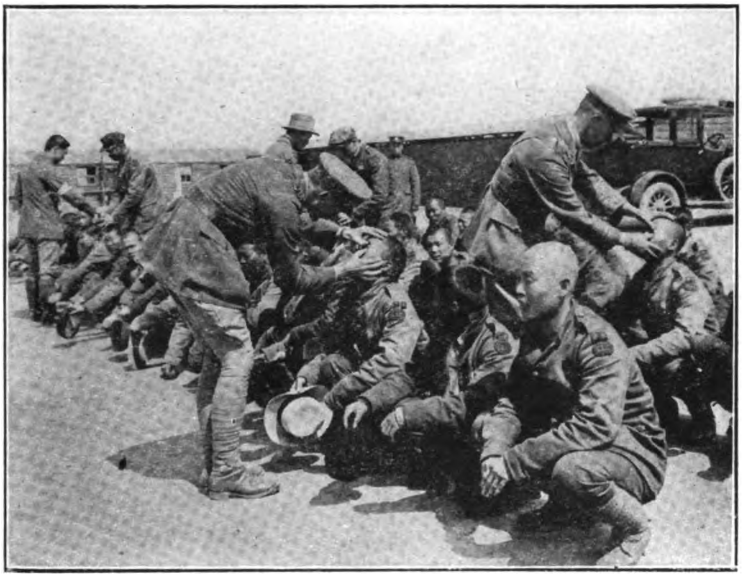


Fig. 5. Method of watching progress of infected cases.

Owing to the pressure of the other duties, it was impossible for me to devote a continuous period to this survey, and the examinations were spread over a period of four months. The companies in the advance zone were covered by short trips from the Medical Consultants' Headquarters at Neufchateau, while those in the intermediate and base sections were covered by a special tour beginning on October 10 and ending November 10.

Our companies were small, sometimes not more than 50 men and never more than 300. They were very widely scattered and engaged on all sorts of projects.

The technic of the examination was that used by the British, already described. A record was made of the individual numbers of the men affected. A copy of this record was left with the company, a copy was sent to the Medical Division of the Labor Bureau, and a copy filed in the Consultants' office. Thus, at the end of the inspection we had a record of all the diseased cases found at the time of the examination.

Cases were classified as Z, or trachoma, only when the diagnosis was evident. All doubtful cases were classed as Y, or conjunctivitis. In the Y class it was attempted to put only doubtful cases of trachoma and cases of conjunctivitis with secretion which appeared to be contagious. During the examinations, quite a number of cases of old trachoma, noncontagious, with smooth conjuntiva and old scars were encountered. These were passed as being harmless. The largest number of this group appeared among the North Africans. A number of eye conditions other than conjunctivitis were discovered and their treatment provided for.

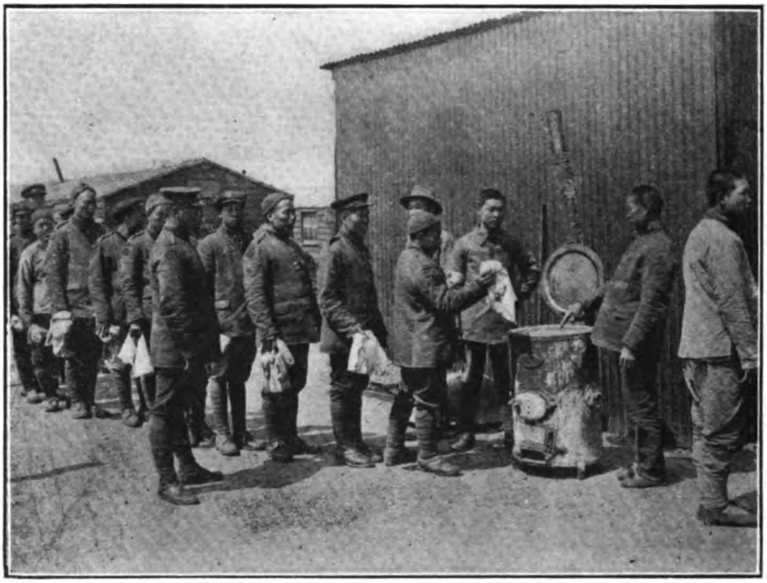


Fig. 6. Men bringing their towels for disinfection.

Our figures show that 12,461 laborers were examined; and that among them were 1,618 cases of conjunctivitis, 13 per cent; and 261 cases of trachoma, 2 per cent. If we separate the nationalities we find:

1. Northern Chinese, 4,958 examined; 1,090 with conjunctivitis, 21 per cent; and 160 with trachoma, 3.2 per cent.
2. Indo-Chinese, 1,795 examined; 284 with conjunctivitis, 16 per cent; and 44 with trachoma, 2.4 per cent.
3. North Africans, 1,291 examined; 51 with conjunctivitis, 4 per cent; and 18 with trachoma, 1.5 per cent.
4. Mixed, 4,417 examined; 193 with conjunctivitis, 4.3 per cent; and 39 with trachoma, 0.9 per cent.

As noted before, the North Africans showed a large percentage of healed trachoma.

Our percentage of trachoma among the Northern Chinese (3.2 per cent) is much lower than that found at first by the British (8.5 per cent), but compares well with their later shipments. This may be accounted for by the fact that a number of our Chinese companies examined had already been gone over and the cases of trachoma weeded out. Several of the companies that had been previously weeded out, however, showed a number of fresh cases of trachoma and a considerable amount of conjunctivitis. As a rule, the trachoma seen among our Chinese was in an early stage. In very few cases was it disabling.

As it was not possible in the beginning to follow the British lead and establish conjunctivitis and trachoma companies for the diseased eyes, it was decided temporarily to look after them in each company, as no other course remained open to us under the circumstances. A circular was therefore drawn up and sent out to every company by the Labor Bureau describing the purpose of the examination and the various measures to be employed. After the examination of each company, or of each group of companies when more than one were in the same area, the Commanders of companies, the Medical Officers responsible for them, and when possible the Ophthalmic Specialist attached to the nearest hospital, were gathered together and the situation was thoroly discussed and instructions given for the isolation and treatment of the Y and Z groups.

In many instances, the companies were in fairly close proximity to a Base or Camp Hospital at which there was an ophthalmologist stationed. He was informed of the policy decided on, and the general direction of the eye situation was intrusted to him. Active cases of trachoma were treated by him, as were those of the conjunctivitis group which needed special treatment.

A report was made to the Chief Surgeon of the American Expeditionary Forces, and to the Labor Bureau, giving in detail the figures of the various companies and the following recommendations were made:

"Trachoma cases should be isolated in special companies. These companies should be worked in some hospital area where they can be under the supervision and care of the Ophthalmic Specialist. The Director of the Labor Bureau has already ordered the formation of a trachoma company at a hospital center." Until these trachoma or Z cases could be transferred to such a company, instructions were given to include them with the Y or conjunctivitis cases.

"Conjunctivitis cases (Y) should also be put in special companies and given appropriate treatment. Until this can be carried out, the following course should be adopted, and the Commanding Officers of all companies have been instructed in the procedure. The men should be isolated in a separate barracks or part of a barracks. They should, as far as possible, wash separately, eat separately and work separately from the clean men. Their towels should be boiled for thirty minutes twice a week, as should handkerchief when in use. Local treatment consists in the administration of zinc sulphat drops (.3 per cent) twice a day. This treatment may and should be carried out without interfering with labor."

A detailed description of the British system of using the "Universal Drops" was then given as already quoted.

"The Y, or Conjuncfivitis cases, should be examined by an Ophthalmic Specialist every three weeks. In six weeks, it should be possible to tell which of the suspicious cases are in all probability trachoma, and measures taken accordingly. Where trachoma has existed in a company, a certain number of the X, or clean, men will later develop it, and these must be carefully watched for. Unfortunately, labor companies move so frequently that arrangements for the supervision of the Y cases will break down in many instances under this system. If alien labor companies, especially Chinese, are to be employed for any long period of time by the American Expeditionary Forces, some provision for the formation of Y companies should be made."

"Clean (X) Companies.—The Medical Officer in charge of X Companies should be on the constant lookout for fresh cases of eye disease. If these cases do not respond to treatment in a short period of time, the advice of the nearest Ophthalmologist should be sought."

It should be remembered, in considering the trachoma problem, that the ordinary methods of handling trachoma in civil life do not apply here. We were in France to help win the war, and it was our duty to help the labor authorities by every means in our power by getting every possible ounce of work out of the labor companies. The British had shown conclusively that under a well organized system the disease could be controlled and labor rendered more, rather than less, efficient. Moreover, in the busy times we faced it was impossible to occupy hospital beds with any considerable number of trachoma cases. Rather than do this, the authorities preferred to send the laborers home, and in but few instances was this necessary.

A comparatively small number of cases of trachoma was found among our soldiers in France, and the proposal was made by the Senior Ophthalmic Consultant to the Chief Surgeon's Office that all such cases be segregated in a hospital area where they could have proper treatment and could be used as labor. On the ground that there were not enough of them to make this procedure worth while, this suggestion was not acted on, and they were held for treatment in the various hospitals.

In a large part of the inspection Lieutenant-Colonel Nelson M. Black, M. C., was associated with me and was of the greatest assistance. At times when Lieutenant-Colonel Black was not available. I was very efficienly aided by Lt. H. B. Chandler, M. C; Captain Ralph Hatch, M. C.; Lt. R. J. Sprowl, M. C.; Captain Lloyd Whitham, M. C.; Captain C. F. Jump, M. C.; Major George W. Jean, M. C. At all times the assistance and cooperation of the Medical Division of the Labor Bureau was given without stint.

I feel strongly that the Ophthalmic Service of the American Expeditionary Forces owes a very large debt of gratitude to the British Service, not only in the special line of trachoma, but in many other ways. Many features of the admirable system developed by Colonel W. T. Lister, ably seconded by Major J. F. Cunningham, were taken over by us and added greatly to the development of our service.

The following circular was issued by the labor bureau for the instruction of their officers and personnel:

AMERICAN EXPEDITIONARY FORCES

Labor Bureau, A. S. C.,
Office of Surgeon,
Medical Division, A. P. O. 717,
France, Oct. 21, 1918.

Circular No. 4.

To Medical Officers Assigned to Administrative Labor Companies.

(Through Commanding Officers.)

1. A survey is now being made of the Administrative Labor Companies, A. S. C., under the direction of the Medical Division, Labor Bureau, by the authority of the Chief Surgeon American Expeditionary Forces, as described in Circular No. 2, Medical Division, Labor Bureau, Aug. 7, 1918. The purpose of this survey is to determine the extent of contagious eye diseases with the view of preventing infection and promoting efficiency.

2. Administrative Labor Companies, especially those composed of Chinese and Indo-Chinese, are frequently liable to two contagious eye diseases, Conjunctivitis (pink eyes), often in its chronic form, and Trachoma.

Conjunctivitis is a contagious eye disease which spreads rapidly by contact. It is, however, readily curable under proper treatment, and suitable precautions will limit its spread.

Trachoma is likewise contagious; but unlike conjunctivitis, it is very resistant to treatment and in its more severe forms produces irreparable damage to the eyes and may interfere seriously with the efficiency of laborers infected. Certain early cases of trachoma are impossible to distinguish from chronic conjunctivitis until they have been for some time under observation. The spread of trachoma may be checked by suitable measures. Proper treatment will arrest its progress.

Contagion. Both diseases are conveyed from one individual to another by direct contact with secretion from the affected eyes, by personal contact, by infected towels and by the use of the same wash basins. Cleanliness is the greatest enemy of these diseases.

Classification. The present survey will divide the laborers of each company into three classes:

Class X comprises the individuals with clean eyes.

Class Y comprises laborers with conjunctivitis. A few of these may later show trachoma.

Class Z—Trachoma cases.

3. As a *Preventive* measure in all labor companies, each man should have his individual towel and soap. Towels should be boiled for thirty minutes twice a week. The same should apply to handkerchiefs.

Class Y should be isolated so far as possible without interfering with their labor. They should live in a separate hut from Class X, or, at least, a portion of a hut should be partitioned off for their use. They should wash separately and eat separately from Class X, and should work in a squad by themselves as far as is possible.

Local treatment of Class Y need in no way interfere with their labor. An aqueous solution containing one-third of one per cent Zinc Sulphate and two percent Boric Acid is used.

This treatment is best carried out in the following manner: At a suitable time before going to work and after returning from it, Class Y cases report for treatment. They squat down on the ground in one or more lines, pull down their lower lids and look upward. The Medical Orderly passes along the lines with an assistant. The assistant, who stands behind the laborer, steadies the head with his hands, the Medical Orderly in front instills with a dropper one or two drops of the Zinc Sulphate solution which he carries in a small glass. This procedure may be carried out easily without having the dropper come in contact with the eye that is being treated. An orderly may be quickly trained in this work. By this method, up to one hundred cases may be treated in fifteen minutes. After the application of Zinc Sulphate, the eyes will smart for from one to five minutes, but not longer.

4. Z *Cases* will be reported by number to the Medical Division, Labor Bureau, A. P. O. 717. Orders will be issued transferring them to special trachoma companies. During the interval between the discovery of trachoma Z cases and their removal, they will be subject to the same precautions and treatment as pertains to Class Y. If due precautions, as outlined, are observed, laborers infected with conjunctivitis, X cases, and trachoma, Z cases, may be handled without danger of infection to other laborers or troops.

W. H. Honor,
Major, M. C., U. S. Army
Surgeon Medical Division, Labor Bureau.
A. S. C

GRANULOMA OF THE CORNEA

M. Feingold, M.D.

NEW ORLEANS

With reports of two cases, this paper gives a critical review of the literature, and draws the conclusions it seems to justify. Read before the American Academy of Ophthalmology and Oto-Laryngology, August 5, 1918.

Possibly no structure of the body has been the subject of so much study, clinically and especially experimentally, as, owing to its peculiarities, the cornea. But in spite of the many varieties of corneal affections described, and tho the process of healing of wounds of all kinds of this structure, has been studied and recorded minutely, one fails to find, even in the best and most modern textbooks, any mention of granuloma formation of the cornea. For this reason, the following cases seem to deserve recording, and a review of the few cases reported in the literature might not be amiss. This seems especially desirable since some of the case literature is not easily accessible and because the condition is generally placed among the tumors of the cornea instead of among the inflammations and their consequences.

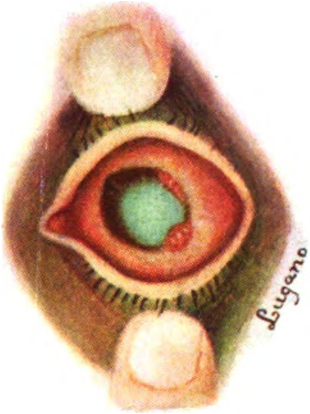
Case 1.—H. J., colored, laborer, aged 56, applied at the Charity Hospital Eye Clinic, Nov. 9, 1917, stating that, three weeks before, muriatic acid had splashed into his eyes and that the right one was so badly injured by it that enucleation had to be done two weeks later. The conjunctiva of the eyeball appeared reddish white, the whole cornea grayish, and he could notice hand movements. Gradually a grayish-red soft granuloma 3 by 3 by 2 mm. appeared on the conjunctiva of the eyeball at the lower temporal limbus, and a similar flat one 3 by 1.5 mm. at the upper temporal limbus.

Dec. 6, 1917, the lower granuloma was seen riding on the limbus with its greatest portion on the cornea, while the smaller granuloma was entirely on the cornea near the upper limbus. The cornea appeared at first glimpse quite clear in the peripheral portion, but this was due only to invasion of superficial and deeper vessels from all sides; thru it, the iris could be guessed at. The central portion was whitish opaque and slightly depressed, with irregular surface. Light projection and color perception were good.

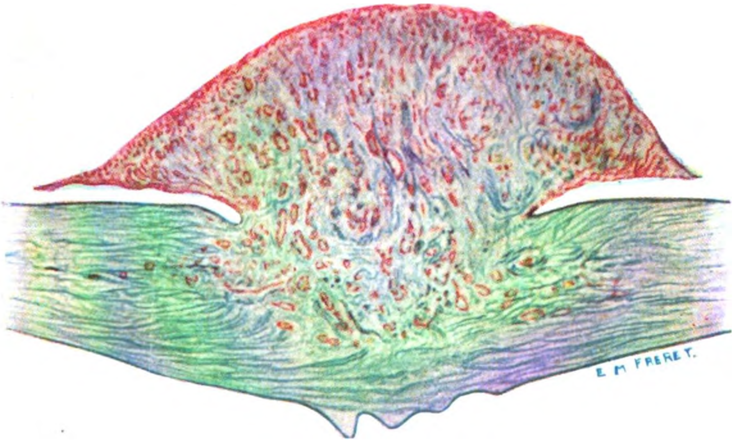
Later the upper granuloma moved 2 mm. from the limbus to the center getting smaller at the same time and appearing more red; the lower granuloma also grew smaller and more flat. The central area of the cornea became more bluish white and smaller, because encroached upon by the increasing ring of vascularization; the thickened grayish-red conjunctiva of the eyeball extended on to the cornea forming a false pterygium in several places. This was especially noticeable at the seat of the lower granuloma, which in the meantime had moved away from the limbus, leaving a narrow band of cornea between itself and the limbus. The upper nasal portion of the cornea cleared perceptibly and the patient could see faces.

Three months after the accident, the lower granuloma was smaller, triangular, and apparently pedunculated while the upper granuloma had entirely disappeared. During the further observation even the lower granuloma faded away gradually and the whole cornea cleared sufficiently so that, about May 1, 1918, patient could read 2-inch letters close to the eye. During the whole time the tension was carefully watched and always found to be below normal on palpation. Only once did the tension seem to be increased. Treatment consisted only in inspersion of ethyl-morphin hydrochlorid powder. See Fig. 1, Plate XI.

Case 2.—E. B., a farmer, aged 42, called at the Charity Hospital Eye Clinic, Sept. 29, 1915, because of inflammation of his right eye, which had begun when some unslacked lime got



CASE 1. GRANULOMAS OF THE SCLEROCOREA.



CASE 2. GRANULOMA OF CORNEA. MALLORYS CONNECTIVE TISSUE STAIN: X24.

into his eye three weeks before. The eye showed moderate ciliary injection; the corneal epithelium was markedly defective, the cornea itself diffusely nonsaturated, bluish, opaque with a deep seated, round, 3 mm. gray infiltration slightly below the center. There were 3 mm. of hypopon.

The hypopyon soon became absorbed but recurred several times. Gradually a small, soft, redish-gray tumor of granulation tissue appeared near the center of the cornea. Acetylsalicylic acid, ethyl-morphin hydrochlorid, argyrol, atropin, and physostigmin (eserin) were used to meet symptoms and indications. Repeated attacks of severe pain caused by increased intraocular tension finally necessitated enucleation which was done under local anesthesia, March 20, 1916. The eyeball was immediately placed in Zenker's solution, after hardening bisected in the equator and sectioned horizontally by Lee's dry celloidin method.

Histologic examination.—In the conjunctiva only a few plasma cells are seen, but the epithelial cells have a tendency to desquamation. The cornea is slightly pressed in toward the anterior chamber in the central part. This was apparently caused by the lid bulging the softened cornea in, when pressing on the projecting growth. The cornea is about 0.6 mm. thick in the periphery, somewhat thicker in the central portion. Here a mushroom-like growth is lying on the surface and is continuous with the corneal substance by its very short pedicle. The epithelium is missing on the whole corneal surface. At the limbus the epithelium of the conjunctiva projects for a short distance over the cornea, but is not in contact with it, forming a folded band which often folds back on itself toward the limbus. See Fig. 2, Plate XI.

But for an isolated, cell-like structure here and there, Bowman's membrane is entirely bare of epithelium. It is continuous over the whole surface of the cornea, except for about 0.98 mm. in the center corresponding to the pedicle of the growth. It is about 16 microns thick and seems to consist of two portions. The superficial one is about 3 microns thick and stains rather deeply with hematoxlyin and purplish with Mallory's connective tissue stain. The posterior portion stains more like the corneal substance. The anterior portion splinters off here and there to some extent from the underlying portion. Bowman's membrane, and to a slighter extent the adjoining lamellae of the cornea, contain numerous, small, amorphous and more crystalline, yellowish brown particles of different size (argyrol?). Bowman's membrane is everywhere in normal contact with the underlying parenchyma. In some sections, near the pedicle of the growth, masses staining intensely blue with hematoxlyin are seen between Bowman's membrane and the parenchyma and also in the spaces between the next three or four layers adjoining. These masses are fine and linear or more lumpy and often mask the corneal struture entirely (lime?). Numerous vessels pervade the whole cornea, lying mostly in the anterior two thirds. A few smaller vessels are immediately below Bowman's membrane. In the immediate neighborhood of all the vessels are seen cells, each with a long nucleus, staining deeper than the corneal cells, also an occasional eosinophil. The whole cornea is seemingly unaltered except that the fixed cells are evidently more numerous than normal. Higher magnification reveals some of these, at least, as possibly wandering cells, since their nuclei stain deeper blue and since two or three cells are at times seen in the same space. Except for the affected area, the cornea shows no differences in the arrangement and appearance as to color, etc., of the lamellae, in spite of the marked opacity in vivo.

The affected area is about 2.8 mm. in the largest diameter and is consequently larger than the defect in Bowman's membrane. It is roughly lenticular in cross section, that is, thickest in the center. It occupies the middle layers of the cornea, leaving the posterior fourth entirely free. Its edges are entirely in the deeper layers with comparatively unaffected corneal substance in front of it. Over the central portion, on the other hand, corresponding to the defect in Bowman's membrane, this area extends even thru the anterior layers, and is here continuous with and forms the pedicle of the mushroom-like growth on the surface. In the affected area, the lamellae have lost their parallel arrangement, have changed direction, and have a tendency to bend forward into the pedicle. The lamellae are more widely separated and are possibly fewer in the center. The vessels are very numerous, especially near the pedicle. Between the separated lamellae and surrounding the blood vessels, numerous cells of the following types are found: (1) cells, each with a large, pale vesicular nucleus: endothelial and young connective tissue cells; the nucleus is often smaller and distorted by the surrounding tissue; (2) plasma cells; (3) polymorphonuclear leukocytes; (4) occasional eosinophilic leukocytes; (5) small, round cells, apparently lymphocytes; (6) cells in mitosis, most probably of the type mentioned in Group 1. The character and arrangement of the cells varies from place to place. Here the plasma cells prevail, there the polymorphonuclear leukocytes, etc.

The growth projects above the surface of the cornea about 0.93 mm. and is about 2.25 mm. in the greatest meridional diameter. It is button or mushroom-like, overlapping the cornea because it is bigger than the opening in Bowman's membrane, through which it is continuous with the corneal substance. Only in a small area does the growth appear more sloping on the surface and not overhanging. It is not covered by epithelium. On and near the surface, a network of fine fibers, arranged more or less parallel with it, is seen. These fibers have all the appearance of fibrin. Here they enclose an edematous area, there the network contains numerous leukocytes and traces of extravasated blood in other places. The skeleton of the growth is made up of more or less radially arranged fan-rib-like septums of connective tissue and possibly of some remnants of corneal tissue. Small and large vessels often showing bifurcations are very numerous. The vessels are arranged in a fanlike manner as in papilloma and near the surface are seen rather large sinus-like cross sections, filled with blood. The space between the connective tissues groundwork and the vessels is filed with cells of various character. They are all of the same nature as those of the affected area of the cornea, but are more numerous and the relative frequency is here different, the cells having large, pale, oval nuclei, and the leukocytes generally prevail. Plasma cells are also more often seen than in the cornea.

Behind the affected area more numerous nuclei are seen than in the balance of the cornea. The posterior surface of the cornea bulges somewhat toward the anterior chamber and shows undulations. These are due to wrinkling of Descemet's membrane which forms archlike projections into the chamber. There is no break in Descemet's membrane. These arch formations seem to be partly empty; partly they contain fine granular coagulum staining pink with eosin and partly some stratified tissue rich in nuclei, resembling the adjoining cornea.

Over the central part of the cornea, the endothelial cells are almost entirely missing; an occasional cell on the posterior surface of Descemet's membrane cannot positively be identified as such and resembles more a lymphoid cell. Only near the angles of the chamber are the endothelial cells forming a continuous layer, but are even here fewer than in the normal eye.

The anterior chamber is about 1 mm. deep in the center. The angle is perfectly free in most sections and the structures surrounding it are almost normal; in a few sections, a peripheral adhesion of the iris to the cornea measuring about 0.4 mm. is seen. The anterior chamber contains only a slight amount of granular, pinkish staining coagulum containing a few cells of lymphoid character.

A small focus of lymphoid cell infiltration is found in the iris root and a similar one near the sphincter. A small, broken-up posterior synechia exists in the pupillary margin. Ciliary body, choroid and the other structures show nothing of interest. There is no glaucomatous cup.

NATURE OF THESE CASES.

From the description, it is quite clear that Case 2, showed the characteristic symptoms of corneal burns, not the subject of this paper, such as loosening and desquamation of the conjunctival epithelium, failure of the corneal epithelium to adhere, etc., together with a condition in the cornea, having all the histologic characteristics of a granuloma, which had developed in the anterior layer and on the surface near the center as a result of the destruction of the corneal tissue by lime. The clinical course of the first case makes it almost certain, in spite of the lacking histologic examination, that here also the growths were pure granulomas. These, tho ultimately situated on the cornea, had their beginning in the conjunctiva of the eyeball near the limbus. With the advancing clearing of the necrotic area, the granulomas advanced more toward the center of the cornea, shrinking in the periphery on account of the scar formation at the rear, until ultimately all the remaining granulomatous tissue was choked off by the scar formation and the accompanying reduction of the blood supply.

A search of the literature for cases of true granuloma of the cornea will have to exclude at the outset the formations of granuloma tissue as the result of tuberculosis and leprosy. These cases undoubtedly belong to a different class, as is already evidenced by the etiology. One cannot positively class with these cases Bock's reports of granuloma following parenchymatous keratitis, on account of our present view concerning syphilitic parenchymatous keratitis.

TYPES OF GRANULOMAS.

If we thus limit ourselves to the pure granulomas of the cornea, it is for practical reasons advisable to divide them into the following three groups:

1. Granuloma in the region of the cornea, the result of a prolapse of the iris following perforation; this might properly be called granuloma of the *pseudocornea.*
2. Granuloma of the cornea extending from the conjunctiva of the eyeball near the limbus after injuries, etc.; granuloma of the *sclerocornea.*
3. Granuloma of the cornea, developing away from the limbus and not the result of perforation; granuloma of the cornea proper.

1. It is evident that the cases of our first group cannot be classed as granulomas of the cornea, but they are here considered for purely external reasons only. While not very frequent, they are more often to be observed than the other two forms of granuloma. In our second case, a superficial examination gave one the impression of a granuloma of this kind, as depicted by Parsons, Fig. 103. In Blaskovics' case, to be mentioned later, this possibility was also considered. In this group belong the two cases of Sichel, his observations 205 and 206, since perforation of the cornea had occurred in both instances. The case of Schmidt-Rimpler was probably of the same kind. His patient, a young laborer, after getting lime in both eyes, had paracentesis done on the right cornea on account of hypopyon. After nine months the right cornea was entirely opaque, everywhere traversed by blood vessels and showing a thick button of granulation tissue.

Schaeche's case of a boy who developed panophthalmitis with perforation, after mortar injury six months before, also belongs here. Large, mushroom-like granulomas formed at the point of perforation.

The case represented by Pagenstecher and Genth on their Plate 12, Figures 3 and 5, may possibly be classed here.

Lawson's case of a cicatrix horn growing from the cornea, seems to be an unusual form of granulation tissue formation developing after corneal perforation.

2. Of the granulomas belonging in Groups 2 and 3 of the foregoing classifications, the textbooks make no mention whatsoever. The American Encyclopedia of Ophthalmology contains

only meager reference to these conditions on pages 3436 and 5631. A good description by Wintersteiner with enumeration of the cases reported is found in the German Encyclopedia and may be repeated here: "As granulomas of the cornea have been described some few reddish, soft tissue-granulations growing to pea size which later become pedunculated and regressing and which developed after an ulcer, an injury, or a chronic inflammation." No mention of the condition is made in the French Encyclopedia.

The only other references to granuloma of the sclerocorneal type in the available American literature are found when Weeks, discussing granuloma pyogenicum of the lids, wonders whether the so-called granuloma of the cornea or of the sclerocorneal margin is not akin to it. The granuloma of the cornea has a tendency to recur, he says. He has examined two sclerocorneal tumors. In the same discussion, Jackson mentions a case of granuloma at the margin of the cornea, in existence six to eight weeks, having a purplish red surface; the edges reminded one of an epithelioma, but were perfectly soft.

In the discussion of burns of the eyeball by lime, Lewin and Guillery mention the following cases in which the granuloma formation began in the conjunctiva of the eyeball and advanced onto the cornea. (1) The cornea of a mason's helper, after mortar had splashed into his left eye, became covered with granulation tissue, reaching from the limbus almost to the center altho no ulceration had developed. (2) The case of Desmarres of a mason whose cornea after he had fallen into a lime pit became covered with a sarcomatous growth. (3) After getting lime into the right eye twenty-five days before, a boy showed mulberry excresences on the swollen conjunctiva and the vascularized limbus. Two months later, the excrescences covered the whole cornea. After three months, only a small point of the cornea was clear and the remainder was covered by an enormous granulomatous mass pedunculated at the base. (4) Gosart's case of a fleshy pterygium which partially covered the cornea.

In this group also belongs, without doubt, our first case.

Beierle reports a case belonging in this group of hypertrophy of the conjunctiva and granuloma on the otherwise intact cornea of a dog. He assumes injury of the cornea.

3. The most interesting group is formed by those cases in which the granuloma unquestionably originated in the cornea itself, away from the limbus, and did not follow perforation—only resulting from a destruction of corneal tissue, with or without the formation of an ulcer. It is for these cases alone for which the term granuloma of the cornea should be reserved. Search of the available literature discloses only the following cases.

Blaskovics' patient, a woman, aged 25, had recurrent eye inflammation with photophobia when a child. When 8 years old, she received an injury to the right eye and a white spot in the center of the cornea resulted from it. Four years before she came under observation, a red area appeared in the center of the spot and increased gradually. When seen by Blaskovics, the tumor was 10 by 11 mm. in diameter, 1 mm. thick, yellowish red and soft, its surface irregular. Granuloma from an iris prolapse was considered a possibility, but tumor of the cornea finally diagnosed. The examination of the enucleated eye revealed no bacteria. The cornea showed absence of the superficial layers in the center. The deeper layers were loosened. Near the growth the cornea was infiltrated with round cells and numerous vessels extended into it from the conjunctiva. Bowman's membrane was absent in the whole extent of the growth. A 1 mm. band of unaffected cornea extended all around the growth. It was divided by connective tissue septums, forming wide meshes. These contained homogeneous intercellular substance with small round cells, and the nuclei were often in mitosis. He considers it a case of typical granuloma of the cornea.

Blaskovics also quotes as true granuloma the three cases of Bock. In his first publication, Bock relates two cases of granuloma formation of the cornea among ninety-two cases of parenchymatous keratitis. The masses disappeared gradually and left dense opacities. His third case was that of a boy, aged 13, who had had parenchymatous keratitis of the right eye some time before and on whose left eye a growth developed during the four weeks previous to consultation. In the center of the opaque cornea, which showed deep vessels, a growth of 3 mm. was visible. It increased rapidly during the two weeks of observation and became constricted at the base. The excised growth showed the picture of a wound granuloma. Its pedicle was covered with one layer of epithelium. The condition is looked upon as the result of a circumscribed excessive accumulation of lymphoid cells which after breaking thru the lamellae in front of it, could grow unhindered. These cases are not mentioned in Lagrange's excellent work.

The case of Pagenstecher and Genth on their Plate 12, Figures 1 and 2, is an undoubted case of pure granuloma of the cornea proper, tho some misunderstanding has been created in the literature about it, owing to the use of the word sarcoma in the English translation of the German text. Its granulomatous character is also maintained by Lagrange and by Gayet, whom he quotes.

The granuloma in Raabe's case developed at the seat of a healing septic ulcer of the cornea which had been cauterized. The histologic examination showed granulation tissue.

Hirschberg and Ginsberg describe a large, prominent, coxcomb-like, grayish-red granulomatous tumor on the cornea of a girl of 9 having tuberculosis. The tumor showed granulation tissue with numerous leukocytes and areas of myxomatous tissue. It was not covered by epithelium.

A vascular pedunculated growth, developing rapidly after injury, was reported by Bargeton and thought to be possibly a sarcoma, but histologic examination confirmed the clinical diagnosis of botryomycosis. A similar diagnosis was made by Reihaus whose patient, a woman of 46, had much eye inflammation when a child, and whose left cornea showed a small white tumor beginning at the lower margin and extending into the pupillary area. The histologic examination of the excised tumor revealed it possibly to be the product of proliferating inflammation and certain small bodies found are interpreted as "hefa." Axenfeld, reviewing these two cases, says, "There is no proof that any of the cases were any different from what have been described in the literature as granulomas. Further investigation is necessary to determine the pathogenesis of these growths."

Our Case 2 agrees in all histologic essentials with the cases of Blaskovics, Bock, Pagenstecher and Genth, Raabe, Hirschberg and Ginsberg, etc., and is therefore, one of a pure granuloma of the cornea, of which histologic examination could be made.

Bajardi reports a pedunculated granuloma on the cornea of a rabbit, probably resulting from an ulcer. It was covered with epithelium. Gay found a pea-sized tumor on the cornea of a bitch, consisting of a granulation tissue.

It does not seem quite certain that the case of Adler is really a case of granulomas of the cornea although apparently classed as such by Lagrange. Strangely enough, this case does not seem to be reviewed in the contemporaneous German literature. A railroad employee, suffering from gradual diminution of sight with moderate local inflammation of the eyes for two years, showed gray, gelatinous granulations on each cornea, eighteen on the left and fewer on the right eye. The histologic examination revealed them to be a kind of miliary granuloma, consisting of corneal tissue covered by an epithelium much thicker than normal and suggesting those fibrous formations one sees especially on serous membranes following chronic inflammation. But in view of the peculiar histologic findings the bilateral arrangement. the multiplicity of the growths.

and finally because of the occupation of the patient it might be pardonable to think that the condition of each cornea was nothing else but a kind of hypertrophy of the corneal epithelium, as seen at times after recurring irritation, produced in this case by repeated foreign body injuries.

A number of cases are recorded in the literature under different names, such as fibroma, myxoma, sarcoma, etc., in which the condition described can without undue force be explained as some result of granuloma formation of the cornea either showing greater development of fibrous tissue, or showing changes of a myxomatous nature, etc. Some of them are undoubtedly only changes in a pseudocornea following perforation or destruction of the cornea. As such may be classed the cases of H. Adler, Benson Cases 1 and 2, Capellini, Falchi, Gallenga, Mitvalsky, Polignani, Qualino and Guaita, Rogman, Rumschewitsch, cases 1 and 2, Scott and Story, Silex, Simon, Szokalski, Zirm, etc. In this connection Parsons (264, 265) remarks: "No sharp line can be drawn between purely inflammatory conditions and many so-called growths . . . As to the embryonic spindle-celled type of sarcoma, it may be doubted whether some of them are not simple granulomata (granulation tissue)." Similar opinions are voiced by Lagrange, Blaskovics and Wintersteiner.

It is difficult to say where Stellwag's case is to be placed. The histologic examination, tho quite insufficient for classification, is not of such a character as to exclude the possibility of a granulomatous origin.

ETIOLOGY.

In connection with the question of etiology, one will have to consider two points: (1) Under what condition does granuloma arise in tissues and especially in the cornea? (2) Why did the destruction of corneal substance not lead to any secondary infection but only to the formation of granulomas?

On this point, Mallory says, "Healing by granulation is the repair of wounds where there is more or less loss of tissue which has to be filled in by new formation of cells. The injury is often excessive, much foreign material has to be removed."

It is interesting how well this description applies to all cases of granuloma of the cornea in which a good history of the origin exists. Burns of the cornea by lime or other chemicals will be followed by necrosis and the necrotic material will have to be cast off before repair can set in. The same thing will apply to destruction of the cornea by ulcers, vesicle formation, etc. If the corneal tissue has been destroyed by an inflammatory process, such as in parenchymatous keratitis, it need not lead to any loss of substance on the surface, resulting in an ulcer; the process of removal of the necrotic material and the details of repair will be essentially the same, and may, therefore, lead to granuloma formation. It is more difficult to explain how these cases with their long standing necrotic ulceration escape secondary infection and rapid destruction of the remaining cornea. It may possibly have to be ascribed only to a fortunate circumstance that the ever present pathogenic microorganism did not enter the tissues. After vascularization has taken place in the cornea, and even more so after the granulation tissue has begun to develop, the cornea becomes more proof against the attacks of bacteria. In this connection, it is interesting to remember the remarks of Weeks and Axenfeld quoted in the foregoing.

TREATMENT.

In the treatment of these cases, it will be good to bear in mind the continued danger of infection and therefore to limit one's self to as little manipulation as possible. Abscission of the granuloma may not be advisable, in view of the several reports of their recurrence, and especially so because such action may open an avenue for infection. It is best to await the absorption of the granuloma in consequence of the scar formation and the accompanying reduction of the blood supply. This plan was carried out in the first case reported.

BIBLIOGRAPHY.

Adler. Ein Fall v. selt. Cornealaffektion, Wien. med. Wochenschr., 1891, p. 704.

American Encyclopedia of Ophthalmology, pp. 3436 and 5631.

Axenfeld. The Bacteriology of the Eye, Translated by Macnab, 1908, p. 320.

Bajardi. Un caso di granuloma della cornea, Thèse de Lyon, quoted after Nagel's Jahresbericht u. Ophthalmologie, 1905, p. 273.

Bajardi. Un caso di granuloma della cornea Gior. d. r. Accad. di med. di Torino, 1900, p. 452, quoted after Nagel's Jahresbericht u. Ophthalmologie, 1900, p. 222.

Beierle. Wucherung i. Aug. eines Hundes, Monatsch. f. Thierheilk. 4, 273, quoted after Nagel's Jahresbericht u. Ophthalmologie, 1893, p. 546.

von Blaskovics. D. Geschwülste d. Hornhaut, Ungar. Beiträge z. Augenh., ed. W. Schulek; 1900, 2, 131.

Bock. Allg. Wien. med. Ztg., 1883, Nos. 40-43; 1892, No. 22, quoted by Blaskovics.

Desmarres. Traité d. mal. d. yeux, 2, 321, quoted by Lewin and Guillery, p. 769.

Gay. Tumeur de la cornée chez une chienne, Bull. d. l. soc. des sc. vétér. d. Lyon, 5, 45, quoted after Nagel's Jahresbericht u. Ophthalmologie, 1902, p. 735.

Gosart. Quoted by Lewin and Guillery, p. 770.

Hirschberg and Ginsberg. Ein selt. Fall v. Hornhaut-Geschwulst, Centralbl. f. prakt. Augenh., 1905, p. 33.

Jackson. Tr. Sect. Ophth., A. M. A. 1916, p. 67.

Lawson. A Case of Cicatrix Horn Growing from the Cornea, Tr. Ophth. Soc. U. Kingdom, 1900, p. 73.

Lagrange. Traité des tumeurs de l'oeil, 1901, 1, 195.

Lewin und Guillery. D. Wirkungen v. Arzneimitteln u. Giften auf d. Auge, 1913, 2nd edit. vol. 2.

Mallory. The Principles of Pathologic Histology, 1914, pp. 71, 72.

Pagenstecher and Genth. Atlas d. patholog. Anatomie d. Augapfels, 1875, Plate 12.

Parsons. Pathology of the Eye, 1904, 1. p. 169, 264, 265.

Raabe. Beiträge zur patholog. Anatomie d. aeusseren Augenerkrankungen, Inaug. Dissert, Marburg, 1893, quoted after Nagel's Jahresbericht u. Ophthalmologie, 1893, p. 189.

Reishaus. Beitrag zur Aetiologie der Cornea-Fibrome, Beitr, z. Augenh., 1899, 4, 100-111.

Schaeche. Ueber eitr. Panophthalmitis u. Kalkveraetz. Freiberg, 1889, quoted by Lewin and Guillery, p. 773.

Echmidt-Rimpler. Ueber Kalkverletz. d. Aug., Berl. klin. Wochenschr., 1900, No. 36, p. 789.

Sichel. Iconographie ophthalmologique, 1852-1859, Plate 58.

Stellwag. Die Ophthalmologie v. naturw. Standp., 1, 347, quoted after Lagrange.

Weeks. Tr. Sect. Ophth., A. M. A. 1916, p. 67.

Wintersteiner. Encykloped. d. Augenheilkunde, ed. O. Schwarz, 1902, p. 386.

Zirm. Eine eigenth. oberfl. Neubild. d. Corn., Arch. f. Ophth. 1891, 37, 253.

Pajardi. Un caso di granuloma della cornea. This report is of a collective investigation

OPHTHALMO-THERAPEUTIC IGNORANCE REGARDING OPTIC ATROPHIES.

MARK J. SCHOENBERG, M. D.

NEW YORK.

This report is of a collective investigation regarding the current treatment of optic nerve atrophies among American ophthalmologists.

During the past few years the therapeutics of neurosyphilis has been enriched by the addition of one new drug and a new method of medication: salvarsan and intraspinal or intracranial injections.

Knowing the disappointing results obtained by ophthalmologists by their old routine method (mercury, iodids and strychnin), in treating syphilitic optic atrophies I made the attempt a few years ago to obtain a general idea about their experience and attitude regarding the treatment of this condition since the introduction of the salvarsan and spinal medication. I sent letters* of inquiry to several hundred colleagues and received over 200 replies from ophthalmologists of large experience from all over the country.

---

*With this occasion I wish to express my thanks for their frank and prompt reply. I am fully aware of the fact that we have to be very cautious in drawing conclusions from replies coming from an extreme variety of sources. But nobody can deny that an investigation of this sort shows us the general consensus of opinion and gives us a fair idea of how little 200 of the foremost men engaged in this specialty feel that they can accomplish with the present means of treating atrophic conditions of luetic nature of the visual pathways.

(1) Are you obtaining better results in the treatment of progressive optic atrophy of luetic nature since the addition of salvarsan to our therapeutics?

To this question 56 ophthalmologists answered that they never used salvarsan; 106, that the results are worse or indifferent; 24 regard with favor the use of intravenous injections of salvarsan, but add that their experience is very limited.

(2) Do you use intraspinal injections in luetic atrophies? What results?

To this question 139 answered that they never used spinal injections; 4, that their experience is too limited to give any opinion; 23, that they have used this method with no success; 17 have used the spinal treatment in 1 or 2 cases and were favorably impressed.

As we see, the majority was unfavorably inclined towards the intravenous administration of salvarsan. As for the spinal treatment the state of affairs is still gloomier: The method had not even been given a trial by most ophthalmologists.

This investigation will surely raise in the minds of the readers a number of objections and comments. Nothing can be answered to the objection (if they have any) of those who never tried salvarsan under any form or method. No definite conclusion can be drawn even from the statement of those who say that the results (in cases treated by intravenous salvarsan injections) are indifferent or bad, because: (a) In the replies received the confusion is frequently made between the neuritic and taboparetic type of optic atrophies; (b) Nothing is mentioned about the dosage and total amount of salvarsan, frequency of administration, duration of treatment, etc. Many have given up the treatment after 1 or 2 injections, which does not prove anything.

Regarding the lack of experience with the intraspinal treatment of 143 out of 183 ophthalmologists we have the impression that it is due to the fact that this method is considered by our confréres either very difficult, dangerous or ineffective. The question of efficacy of spinal treatment and intravenous injections of salvarsan will be discussed more fully in another paper. The statement of those who have used the spinal treatment without beneficial results cannot be accepted as first class evidence, because we are not furnished with results regarding the condition of the patients and how systematically the treatment had been carried out.

The writer knows of cases which have been given up because one or two spinal injections have failed to improve the vision, or because vision continued to fail after the first injection. These cases and such treatment do not prove anything. An arrest of the process causing the failing vision or even an improvement should be expected only after a systematic course of 6 to 12 or more spinal treatments have been administered, combined with a general cautious but persistent antiluetic treatment. It is superfluous to add that the technic of spinal puncture is not very difficult, nor is it dangerous if done with care. The tens of thousands of spinal punctures done with impunity in this country and abroad prove my contention.

Among the questions and suggestions contained in the replies to my circular letter the following ones deserve to be mentioned:

1. Many ophthalmologists are of the opinion that salvarsan acts injuriously upon the optic nerves which are in the process of atrophy; others believe to the contrary, that it is more injurious in nonluetic atrophies; and still others think that salvarsan may cause atrophy in perfectly intact optic nerves. Since these opinions are in part based on hearsay and in part upon a *post hoc propter hoc* occurrence, we have no right to accept them as facts. Time and accurate observations will clear up this point. To those who have used a great deal of salvarsan in syphilis of the central nervous system one thing is clear, namely, that it is *not* injurious to the healthy or damaged optic nerves, if

administered in proper doses and at proper intervals.

2. Some express their belief that the drug is beneficial only in incipient cases of optic atrophies. Experience shows that this is true only in some cases. I have seen patients with a moderately advanced optic atrophy greatly benefited by spinal and general treatment.

3. Some, notwithstanding the numerous reports in neurologic literature, consider the spinal treatment as a dangerous procedure. My own experience is opposite to their belief. I have never seen one single case in which I had reason to regret the use of the spinal method of treatment, and Dr. I. Rosen, Chief of the Department of Syphilis of the Vanderbilt Clinic, who has given several thousands of injections, never had a single accident.

4. A few gentlemen from Philadelphia have based their doubts on the value of salvarsan in optic atrophies upon the supposition, almost universally accepted, that the drug is a spirochetecide and not an antidegenerative. While this objection seems to be quite right, we must not forget that there is still a possibility that the action of salvarsan may not be directed only upon the spirochetae, but may (as I think very probable), act upon the tissues as a stimulant as well. Furthermore, it is a fact that there are cases of optic atrophies in which the process was arrested by the systematic and judicious treatment with salvarsan and mercury.

5. How much should we fear a Herxheimer reaction while treating lues of the optic nerves, is a question brought up by a few colleagues. A very well known and highly reputed ophthalmologist does not use the salvarsan on account of a possibility of setting up a reaction in the optic nerves of sufficient intensity to cause a permanent damage to the nerve fibers. This fear, very current at the beginning of the salvarsan era, has gradually subsided now, when we use much smaller initial doses preceded by Hg. intramuscularly.

6. One colleague calls my attention to the fact that in some patients with chronic or latent nasal sinusitis the condition may become acute under the influence of salvarsan; and thus act upon the optic nerves—a sort of Herxheimer reaction in the nasal sinuses.

7. Finally, a large number of ophthalmologists, many of them among our leaders, flatly declare that their experience with the treatment of luetic optic atrophy is limited, because they refer their cases, where they belong; some to neurologists, others to syphilographers. It is undoubtedly correct to have the patient examined by a trained neurologist, because the patient has, most of the time, syphilis of the entire central nervous system, not only of the optic pathways. It is probably advisable to put the patient in the hands of a syphilographer experienced in the treatment of neurosyphilis; but it is unfortunate to throw him overboard and let the neurologist or syphilographer take entire charge of him. We have only to read up the reports on cases of neurosyphilis with eye manifestations, and, no matter who the author is (be he a leading syphilographer or neurologist), we will be surprised by the lack of completeness of and interest in the ophthalmologic phase of these reports.

Reliable ophthalmoscopic examinations, fields of vision, measuring of the acuity of vision, etc., can be made only by ophthalmologists; their special interest in the visual organ makes them more fit to judge of the progress obtained and more concerned about the outcome of the entire case. I should consider as ideal to have the ophthalmologist administer the treatment, and have the neurologist and syphilographer act only in advisory capacity. This would give him more experience on the neurologic end of the subject, and would stimulate him to try again to find a better way of treating syphilitic involvement of the optic pathways.

THE DETERMINATION OF DEVIATION IN SQUINT BY THE PRIESTLEY SMITH METHOD, WITH A MODIFICATION TO INSURE GREATER ACCURACY.

WILLIAM F. HOLZER, M. D.

WORCESTER, MASS.

This paper written while its author was interne at Wills Eye Hospital, Philadelphia, describes in detail the Priestley Smith method of measuring squint, with a modification to insure greater accuracy.

The angular method of measuring the deviation in cases of concomitant squint with the Priestley Smith tape does not commend itself as highly as it should, if one may judge from the descriptions usually given in our text books. In most books the tape method is briefly dismissed, oft times with a foot note, or goes unmentioned. Some of the descriptions present a vagueness in the method of its application, neglect to name length of tape or define gradations; and some present contradictions as to position of corneal images.

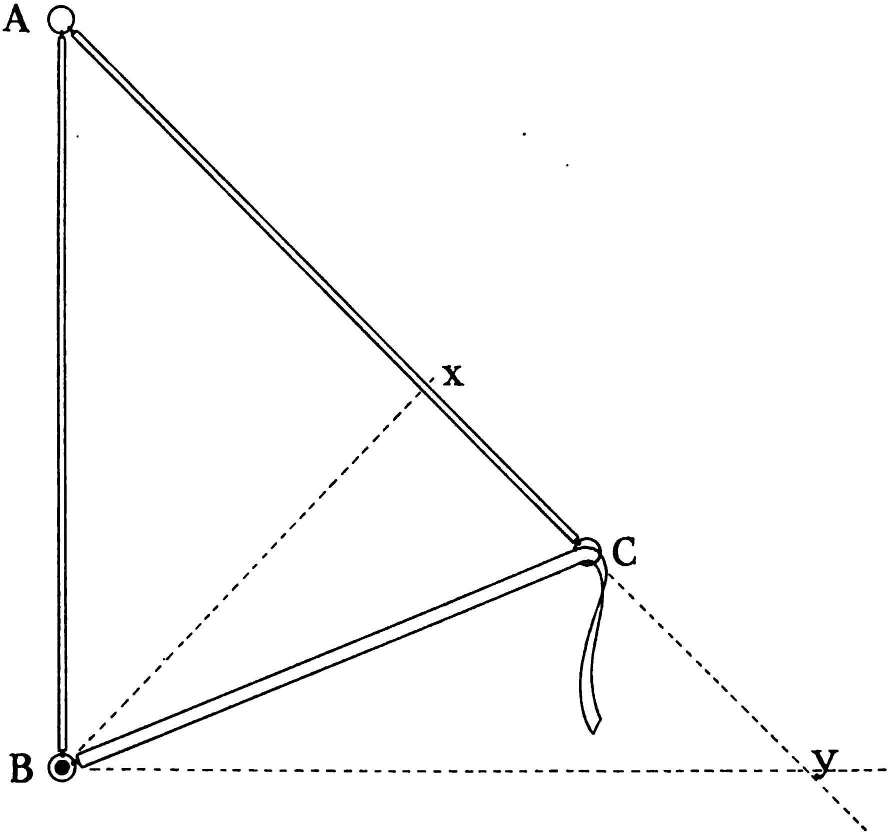
A very important and yet often neglected step in the estimation of a squint is a regard for the angle gamma, or angle kappa of Landolt. The Priestley Smith tape method as described by Worth[1] accounts for the angle, without the necessary separate determination, and addition if positive to convergent and deduction from divergent squints; and vice versa if negative. Worth says in part: "The patient is first told to fix the mirror, while the light of a lamp is reflected into the fixing eye. The position of the image of the mirror, on the cornea of the fixing eye, is noted. The light from the mirror is now thrown on to the deviating eye, and the patient is directed to look at the surgeon's tape hand. This is moved horizontally, till the position of the image of the mirror on the cornea of the squinting eye, is similar to that which it formerly occupied on the cornea of the fixing eye." (Corresponding to the visual axis of the eye.) Practically every other description of the method of application directs the image of the mirror to be placed in the centre of the cornea, which corresponds to the optic axis of the eye; thereby disregarding the angle gamma.

Two criticisms are apt to arise; first, the diviation when fixing at six metres compared with fixing at one metre or at sixty centimetres (length of the later tape); and, second, the error due to measurement on the chord of the arc as compared with measurement on the arc. Maxwell[2] demonstrated that the angle measured at twenty-five centimetres (less than the length of the tape) averaged 2.1 degrees greater than at six metres. The "mathematical error" (the difference between an angle measured on the arc of a circle and the chord of the arc) is so small as to be practically negligible. On the other hand the "observation error" (the inability of the observer to place exactly in a corresponding situation on the deviating eye the position, centric or eccentric of the corneal image in the fixing eye) is common to most methods of measuring deviations, the degree of accuracy depending upon the skill of the individual observer.

The writer has made a slight addition to the Priestley Smith tape, very simple but which he deems quite important; never having seen it noted. It is the addition of a "constant radius," by means of a tape from the ring, held by the patient against the cheek, to the hand of the observer which slides along the graduated tape, maintaining a constant radius.

A cloth or steel tape graduated in centimetres, two pieces of half-inch cloth tape, measuring with rings attached sixty centimetres, and three one-inch steel or nickel rings, one to three sixteenths of an inch thick, constitute the necessary materials for the tape.

The accompanying diagram illustrates the position of the tape in the measurement of a concomitant squint of 45 degrees. To A (ring held by patient against cheek) is attached tape A B and ring B (thru which ophthalmoscope handle is placed). B C represents the tape graduated in centimetres (1 cm. = 1 degree) attached to ring B and passed thru ring C. The tape A C is the writer's addition. Being the same length as A B it maintains a constant radius as the hand slides along the graduated tape passing thru ring C. B C represents the chord of an arc of a circle whose radii are A B and A C.



Position of tapes in determining squint of 45 degrees, showing advantage of additional tape AC (Holzer); which prevents errors from holding tape BC too near patient (X) or too far away (Y).

The determination of deviation is made by the Priestley Smith[3] method. Let us take for example a convergent squint of the left eye. Measurements should be made in a dark room with a lamp situated behind the patient. The ring A is held against the right cheek below the fixing eye by the patient. An ophthalmoscope or retinoscope handle is passed thru ring B and held in the observer's left hand. The image of the light behind the patient is now reflected from the mirror of the ophthalmoscope or retinoscope into the fixing eye, and the patient is directed to fix the mirror. Thru the sight-hole in the mirror the observer notes the exact position of the corneal image. He now turns the mirror to the left eye; the patient still fixing the mirror with the right eye, and notes that the image on the left cornea is situated eccentrically outwards, showing that this eye deviates inwards. He now directs the patient to follow, with his fixing eye, a finger of the observer's right hand over which ring C has been placed. The right hand is gradually moved horizontally outwards along the tape B C while the observer notes the changing position of the corneal image thru the sight-hole of the mirror, until the left eye has rotated outwards enough to bring the image to the *corresponding situation* occupied in the fellow eye (right) when that eye was fixing the mirror. When this point is reached he pinches the tape and reads off the degree of deviation; one centimeter on the tape equalling one degree of deviation.

The same position of the hands and tape can be employed in measuring a divergent squint of the right eye, with the left eye fixing. To measure a convergent squint of the right eye or a divergent squint of the left eye the principle is the same but the hands and tape are reversed. The tape can be held taut between the ring and the finger, obviating the necessity of the weight usually mentioned.

The diagram illustrates at a glance the "constant radius" maintained by the writer's additional tape A C. It presents graphically the advantage of the tape in avoiding errors by faulty position of the distal end (C) of the graduated tape B C. A reading made with the tape in the Bx position would be less than that made at B C, because the distance between the patient and the end of the tape at x is less than 60 cm. With the tape occupying the position By, the reading will be greater than that made at B C, since the distance from the patient and the distal end of the tape at y is greater than 60 cm.

This method is applicable to almost every case. Parsons[4] says: "This test is by far the best for small children of any yet devised." It is almost a purely objective test, accurate, rapid and simple. The tape is compact, portable and inexpensive.

REFERENCES.

1. Worth. Squint, 4th Edition, p. 93.
2. Maxwell. Brit. Med. Journal, Sept., 1896, p. 818.
3. Priestley Smith, Ophthalmic Review, vol. VII, p. 349, 1888.
4. Parsons. Diseases of the Eye, 2nd Edition, p. 569.

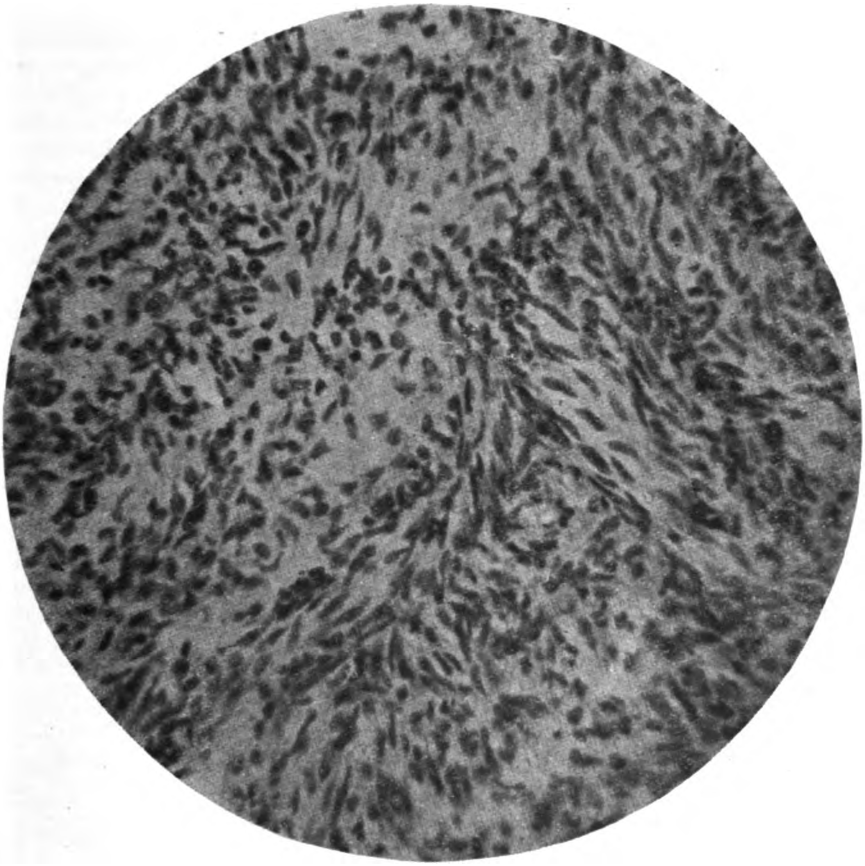
NOTES, CASES AND INSTRUMENTS

PRIMARY SARCOMA OF THE IRIS WITH REPORT OF A CASE.

Harry Friedenwald, M.D., F. A. C. S.

BALTIMORE, MD.

Primary sarcoma of the iris is of such rare occurrence as to warrant the publication of each individual case. According to Laven[1] about 130 were on record in 1913. The case which it is the desire of the writer to report has special interest because it belongs to the so-called leucosarcomata, and because its removal by iridectomy was followed by a satisfactory result during the period of observation of one and a half years.



Primary spindle-cell sarcoma of iris. (Friedenwald's case.)

The patient, Miss E., aged 40, was first examined by me in 1909. Her central vision was perfect. I prescribed glasses and noted that the eye-grounds were normal. I saw the patient again in 1915. In April, 1917, she again came for the examination of the refraction. I found vision perfect in both eyes. But on using the ophthalmoscope I noted slight distortion of the left pupil and on examining the iris with the loupe I observed a small pinkish mass protruding into the anterior chamber from the surface of the nasal part of the iris, about midway between the pupillary and the peripheral margins, and about 2 mm. in diameter.

The diagnosis of sarcoma was made. Dr. George E. de Schweinitz was consulted on May 8, 1917, and he concurred in the diagnosis as well as in the recommendation that iridectomy was indicated. It should be stated that a blood Wasserman was negative.

The patient was operated on May 15, 1917. An incision was made with a von Graefe knife, was enlarged with scissors and a large piece of the iris was excised. The patient made a rapid recovery. There was a slight drop in vision. September 14, 1917, her vision was, Right eye +0.5 cyl. ax. 90°= 20/19, Left eye +0.5 cyl. ax. 90°= 20/38. The patient was last seen on December 12, 1918. The eye showed perfectly healthy conditions nineteen months after the excision of the growth.

The excised iris was given to Prof. Standish McCleary for examination. His report dated May 24, 1917, was that the growth was a spindle cell sarcoma, almost perfectly free from pigment. What little pigment was present was found at the extreme margin of the growth and may have been the pigment of the iris tissue.

The minute size of the growth and its satisfactory removal by iridectomy are of interest and prove that the growth was excised in an early stage. This is also in accord with the view that the nonpigmented sarcoma or so-called leucosarcoma,* of the uvea is an early stage of a growth which in its further development becomes pigmented. According to Schieck[2] the nonpigmented round-cell sarcoma represents the first stage, the nonpigmented spindle-cell sarcoma the second stage, the pigmented spindle-cell sarcoma the third stage. The case reported is therefore typical of the second stage of melanosarcoma of the iris.

---

*The term leucosarcoma as used by ophthalmologists to denote nonpigmented sarcoma should be discarded in view of the wholly different sense in which it is applied by pathologists. "This term, introduced by Sternberg, is meant to designate those cases in which a definite, tumor-like lymphoid mass is developed and is composed of lymphoid cells which seem to escape into the blood-stream giving rise to leukemic alterations of the blood." (MacCallum).

REFERENCES.

1. Laven. Klin. M. f. Augenh., vol. 51, p. 493.
2. Schieck. Graefe's Archiv f. Ophth., v. 60, p. 377.

THE STUBBORNNESS OF SOME CASES OF CONJUNCTIVITIS

By Dr. Juan Santos-Fernandez.

HAVANA, CUBA.

Since beginning my ophthalmic practice in Cuba, more than 40 years ago, I noticed some cases of conjunctivitis, almost always of a catarrhal nature, that resisted all efforts made to cure them, and did not end with the brevity and success of most cases. Sometimes they got much better and were almost on the point of being cured, when the disease regained new strength and caused the patient new troubles, especially when there was need of reading by artificial light. Many times I have been consulted by some patient who even with some pride let me know that he had consulted various physicians and ophthalmologists without having been cured.

Cases of this nature, as they did not mean any mysterious trouble, were almost sure to be included in the long list of "seen without results." I tried not to order the same drugs that had been prescribed for him before; but I was convinced that the failure did not lie in this drug or the other, because with them other patients were cured in 4 or 5 days.

We presumed that this stubbornness was due to a lack of observance of the most rudimentary hygienic principles, violated by even people that occupy the most exalted positions, without any desire to do so. This is due to the fact that one does not apply the same criterion and impartiality to his own troubles as to his neighbor's.

Sometimes by letting the patient talk all he wants we are able to establish a diagnosis, because the symptoms have been felt by himself and the physycian can direct himself to some extent by this. At other times the description misleads the physician because the patient has a mistaken impression of his own troubles.

Generally the patient does not trust much to hygienic councils but wants something that will cure him quickly. Many patients would run away from medicine and doctors if they became persuaded that we, in many cases, only follow the cycle of a disease and that nothing can greatly shorten that cycle, much less stop it *ipso facto*. The physiologic process of the organs cannot be disturbed often without some untoward effects.

Going back to our original thesis, we have been surprised when a case of conjunctivitis that many times is cured with a simple zinc sulphat wash, for example, becomes so unyielding at other times to every drug used in ocular therapeutics, and this without any apparent reason.

In order to have a technical and definite understanding on this matter it is well to follow Hippocrates' recommendation of keeping a reflective observation of every case every day, and by making an examination of the etiologic factors of conjunctivitis in general and especially of the catarrhal cases. We shall lay aside the diphtheritic and the gonococcic types and limit ourselves to the group of so-called simple conjunctivitis, when we are not able to determine its cause, or catarrhal when the symptoms may give rise to some suspicions of incipient trachoma. This is chiefly suspected when after some days of treatment the symptoms do not disappear.

It is known that the conjunctiva is in contact with the air so full of germs, and that the microbian host normally in the eyes is great, while local or general alterations may exalt their virulence and cause a catarrh or any other conjunctivitis.

When the astringent action of the collyria is sufficient to abolish the conjunctival injection or has a bactericidal action of enough strength to counteract the action of the germs described, generally a case of conjunctivitis can be cured in a few days if the ophthalmologist himself (or a trained nurse) is the one that instills several times a day the antiseptic solution used, placing it well inside of the everted *cul-de-sac* of the superior fornix. This generally cannot be done by the patient or his relatives, because the germs lodged in the retrotarsal folds cannot be reached by the simple dropping of some solution inside the lower eyelid. Many patients that do not even wash out the secretion lying upon the lids, this lasting for many hours, and the solutions ordered being applied by unskilled people, it is no wonder that the conjunctivitis develops freely and only ceases after the disease has run its entire cycle and if there have been no complications.

By having the treatment given by the ophthalmologist or some trained assistant as often as required by the virulence of the germ, all this can be avoided. But as it would be impossible for the surgeon to go himself several times a day to the patient's home, the best thing for the patient would be to stay for several hours, or come several times a day to the office, or go to a clinic or hospital where the proper attendance can be had.

After the chief bacteriologic facts of modern science have been known it is easy to see how frequently contagion and infection may occur and how long a conjunctivitis may last, if the proper hygienic rules are not followed closely, and the eye of the patient is seriously endangered by that lack of hygienic principles.

By following this rule we have been able generally to cure stubborn cases that had resisted treatment, sometimes for more than 4 months, thus clearing up suspected cases of trachoma. We have frequently maintained true trachoma can be relieved and often greatly so, but it never can be cured until its three full stages are run.

In short we are of the opinion that conjunctivitis, like keratitis and other ocular affections, has a long course and complications because the patients believe that they can be cured with a simple prescription. This is not always sufficient and there is need of a constant inspection and proper treatment directed personally by the ophthalmologist, or his assistants, in order to know when to modify the treatment and when to supply the same.

Taking all things into consideration it is really surprising that more cases are not lost, due to the carelessness in following the most rudimentary hygienic rules and to the unskilled administration of drugs by nonexpert hands.

SOCIETY PROCEEDINGS

COLORADO OPHTHALMOLOGICAL SOCIETY

April 4, 1919.

Dr. F. R. Spencer, Presiding.

Ectopia Lentis.

D. A. Strickler, Denver, presented four cases of ectopia lentis in the same family. They were the mother and three children, and there was a fourth child which was said to have the same defect. The mother was forty-eight years of age, and had noted defective vision from early childhood. There was no history of unusual eye trouble in the ascendants. Both lenses were cataractous and lay almost horizontally in the vitreous. The vision of the right eye with +4. sphere was 20/200, of the left eye with +9 sphere 20/40. A daughter aged eighteen years had been pronounced normal at three years of age by a former Denver oculist. It was thought that the dislocated lenses were first diagnosed at the age of nine years. The vision was R. 20/200 with —14 sphere, L. 20/70 with —16 sphere. The lenses were both displaced downward and outward, altho not extremely. A boy aged fourteen years was said to have had dislocated lenses at six months of age. The vision was R. 20/70 and L. 20/100 with +3 sphere. The upper margin of the right lens was at the center of the pupil, whereas the left lens was only moderately displaced downwards. The case not shown was in the oldest child, a girl of twenty-one years. There were no other children. Double vision was not noticed in any of the cases.

Discussion. G. F. Libby, Denver, thought that there must be an hereditary factor in these cases.

Edward Jackson, Denver, had successfully needled such a lens. These lenses are of course always more movable than the normal, and it is difficult to make much impression on them with a needle. The lens always shows a marked tendency to heal up unless a decided cut is made. He had extracted such lenses, but a good many more he had simply let alone, giving the patient the best correction possible. If the lens is thoroly across the pupil one has to correct the high myopia, whereas if much of the pupil is free from the presence of the lens one has to correct for the aphakia.

F. R. Spencer, Boulder, referred to a case of his own in which there had been so much dislocation as to amount to a practical aphakia, so that very good vision was had with a high plus sphere.

E. R. Neeper, Colorado Springs. The difficulty of needling can be obviated by needling from the point of traction, and the desired effect can also be more readily obtained by using and rotating a short bladed knife.

Atypical Phlyctenular Conjunctivitis.

D. A. Strickler, Denver, presented a man aged thirty years who since November, 1918, had suffered in his right eye from a condition more or less resembling phlyctenular conjunctivitis. Redness and pain had first come on after driving in the wind, and the first attack had cleared up in a week under atropin. The trouble reappeared after about ten days. There was at present a bleb at the upper outer margin of the cornea, approached by a typical fan of vessels. The urine contained blood, and more albumin than was accounted for by the blood, but the microscopic findings were negative. The nasal condition was apparently normal. The pain was so severe that the patient had had sleepless nights on account of it. The teeth had been x-rayed and one had been removed. Dr. Strickler leaned to the belief that the condition was of tuberculous origin.

DISCUSSION. W. C. Bane, Denver, suggested the possibility of a minute body being carried on the eyeball.

W. C. Finnoff, Denver, had seen the patient two weeks previously at the clinic, and stated that at that time the eye was free from irritation. Moreover the left eye had also been involved.

Edward Jackson, Denver, thought that the left optic disc had a decidedly swollen appearance, and was inclined to suspect the sphenoidal sinus until it had been eliminated. The hematuria looked like tuberculosis.

G. F. Libby, Denver, referred to a case of optic neuritis which he had reported at the December meeting as cured, and in which cleaning out the sphenoidal sinus had cleared up the eye condition with recovery of vision.

W. C. Bane, Denver, spoke of a case in which Dr. Claude Cooper of Denver, in operating upon a nasal case, came across what he supposed to be the optic nerve unprotected, in the sinus.

F. R. Spencer, Boulder, had under his care a case in which bilateral neuroretinitis was probably due to sphenoidal and ethmoidal disease. He also referred to another case seen in the army, in which the loss of vision was undoubtedly due to sphenoidal disease.

W. C. Finnoff, Denver, referred to a case seen with the army in London, England, in which the vision was lost but rapidly recovered after opening the sinuses.

O. M. Orendorff, Canon City, objected that most cases of eye involvement from sinus trouble were from posterior sinus disease, whereas this man was complaining of an anterior eye condition.

Optic Neuritis.

GEORGE F. LIBBY, Denver, made a supplementary report of the case which he had reported at the December 1918 meeting of this society (American Journal of Ophthalmology, February 1919, page 155). On February 10th the vision of the left eye fell suddenly to 5/10, and it remained so for eight days altho a coincident intestinal indigestion was relieved meanwhile. The patient was then referred to Dr. T. J. Gallaher, who found hyperplastic ethmoiditis with slight empyema of the left sphenoid. On February 20, Dr. Gallaher did complete exenteration of the anterior and posterior ethmoidal cells, cutting down the anterior wall of the left sphenoid, and leaving permanent, perfect drainage. On March 3rd the L. V. was 5/4 partly, and on April 16th, 5/4 fully. There were no visible changes in the optic disc during this relapse but toxic irritation of the nerve seemed a reasonable explanation of the lowered vision.

Disseminated Choroiditis.

GEORGE F. LIBBY, Denver, presented a man of forty years who stated that in the summer of 1906 the vision of the right eye had fallen to counting fingers only, that of the left becoming slightly reduced three months later. The patient came under the care of Dr. Alfred Wiener of New York City at this time. KI was given internally, mercurial ointment rubbed into the temples, and dionin instilled into the eye. The vision was restored to normal in one year and a half, and had remained so since. The fundus of each eye now showed the typical picture of disseminated choroiditis, and correction of a low amount of hyperopic astigmatism relieved symptoms of eye strain. There was no history of specific infection, and Dr. W. C. Mitchell had found the Wassermann reaction negative. The general physical condition was good and the patient wholly efficient in his occupation as a bookkeeper.

DISCUSSION.—Edward Jackson, Denver. The appearance of the choroid is that of a syphilitic choroiditis and not of a tuberculous; there are so many smaller spots without areas of complete atrophy.

Dr. Libby (closing), thought that in the absence of definite specific manifestations, the patient, who had been pretty effectively treated according to the history, would be better let alone than scared by suggestion of further active treatment.

Iridodialysis.

W. C. Bane, Denver, presented a man of fifty-five years who had on March 13th been struck in the right eyeball with a leather tip which had flown off a whip with which he was striking his horse. Blindness was immediate, and the pain was very severe for about a day, but no attention was sought for the eye. Seen on March 18th, the iris was found to be detached at the upper outer margin over an extent of about 5 mm. There was blood in the anterior chamber. Vision was of the hand moving at one foot and the tension was reduced to 6 mm. of mercury. Under atropin in one per cent solution, a cantharides-collodion blister to the temporal region, and small doses of calomel and aspirin internally, the general condition of the eye had improved, and the vision had risen to 4/60.

Hemorrhagic Retinitis.

W. C. Bane, Denver, presented a man of sixty-nine years the fundus of whose right eye showed flame hemorrhages below and close to the optic disc, more numerous in the lower nasal than in the temporal quadrant. The disc was swollen and moderately choked. Examination of the urine had revealed nothing pathologic, and the blood pressure was reported normal. The left eye had been poor since childhood from an irregular corneal opacity.

Discussion.—W. H. Crisp, Denver, suggested, as regards etiology, the presence of arteriosclerotic changes in the retinal vessels in the constricted portion of the optic nerve behind the disc.

Staphyloma Sclerae.

H. R. Stilwill, Denver, again showed the case of staphyloma sclerae from injury which he had brought before the society at its December meeting (see American Journal of Ophthalmology, 1919, page 153.) The lens was now cataractous, but the eye had been quiet since December. The patient had good light perception and projection.

Macular Choroiditis.

W. C. Finnoff, Denver, presented a man of thirty-four years whose right vision had been failing for almost a month. He had had a bad cold while in France in February, but had been well since. A week ago he noticed a speck in the center of the right field of vision. He had frontal headaches which increased during the day, and the letters blurred and ran together when reading. The vision was R. 0.9, L. 1.2, not improved with lenses. The right visual field showed a small central scotoma. The Wassermann test was negative, as was also the urine. There was a yellowish area with some pigment disturbance about one-third the size of the disc, and oval in shape, just above the macula of the right eye. There had been some improvement in the condition since it was first seen three days previously. The patient's teeth were bad, and he had been advised to have them taken care of.

Discussion.—Edward Jackson, Denver. It is difficult to ascribe etiology in this case, but the lesion is apparently subsiding; in other words, it is rather of an acute character.

Keratoglobus or Buphthalmus.

J. A. McCaw, Denver, presented a case of congenital buphthalmus in an elderly man. The cornea was 15 mm. in diameter. The lens had been extracted from the left eye, and at the operation the cornea collapsed, falling down into the eyeball, and dropping back after it was lifted. There were six diopters of astigmatism in the cornea. The sclera did not appear to be enlarged, and there were no glaucomatous symptoms.

On behalf of J. W. Lehan, Greeley, the secretary presented a boy of eight or nine years who eighteen months or so previously had become almost completely blind in each eye. The history was practically negative as regards kidney disease. The fundi presented only moderate changes, in the form of small scattered pigment deposits. The condition of the eyes had not appreciably changed for the past six months.

Discussion.—Edward Jackson, Denver, suggested that a Wassermann test should be made. The boy still had his first set of front teeth, worn down to the gum and widely separated. The appearance of the fundus was suggestive of that sometimes seen in women after subsidence of a retinitis of pregnancy. The history and the appearance of the fundus did not suggest retinitis pigmentosa, but the condition was likely syphilitic. The pigment did not appear to be arranged especially around the retinal vessels, but undoubtedly there was a very general degeneration and atrophy of the retina.

Wm. H. Crisp, Secretary.

CHICAGO OPHTHALMOLOGICAL SOCIETY.

April 21, 1919.

Vice-President Dr. A. L. Adams, Jacksonville, Illinois, in the Chair.

Snydacker's Blepharoplasty in Morax' Clinic.

Dr. E. F. Snydacker said that about fifteen years ago a girl came into his service at the Michael Reese Hospital frightfully burned. She was an epileptic; she had fallen onto a stove in a fit, and she had virtually fried the side of her face. From there she got into the Cook County Hospital, and he tried to remedy a severe ectropion of both the upper and lower lids by using Thiersch and Wolfe grafts. These grafts had taken, but were so degenerated and so shrunken that, if anything, they added to the hideousness of her appearance rather than benefited her.

When he saw her it was simply a problem of getting flaps because the injury was so severe, the burns were so deep and so adherent to the bone everywhere, that he realized it was impossible to correct the difficulty with grafts, so his object was to get skin that he could use for plastic purposes, and in looking her over carefully and studying the situation it seemed to him there was one place from which he could get the skin. She was literally fried from the top of the forehead right down to below the jaw, and the only skin he could see that was available was the skin of the neck, and he conceived the idea of taking a long flap, going down the neck.

This skin seemd to be loose and suitable for plastic skin, so he took a long flap, cutting it at an angle, and as the case was so deformed anyway, he had everything to gain and nothing to lose. He began at the angle of the jaw, cut diagonally a flap ten inches in length, turned it up to avoid kinking of the pedicle as much as possible. He laid this on a bridge of gutta percha, and covered the upper portion of the flap with gutta percha. He took a flap from the neck, turned it up, split in two the end with one part covering the upper lid, with the other the lower.

He left this flap in place seven or eight days, at the end of which time it was an easy matter to close the wounds in the neck. The skin was elastic and plastic. The deformity in the neck was largely concealed by the collar. At the end of seven or eight days he cut a bridge off which he did not need because he was able to cover the wound in the neck very easily. He simply cut that off at the time of the operation and was able to close the wound in the neck nicely. In cutting off this bridge he made use of only one suture to close the wound in the neck entirely, the rest of the wound had been closed at the time of the operation, and he found that he made a nice repair of what seemed to him an impossible situation. He showed this girl before a meeting of the Chicago Medical Society at the time and the result seemed a very nice one.

He had occasion, in fifteen years, to do this operation four times. One case was a severe case of lupus which had been treated by the X-ray, and in addition to the lupus she had frightful X-ray burns with great sloughing of the skin. She had lost the side of her nose completely, so that the whole septum was exposed. There was a gapping wound beside the nose. The lower lid was entirely gone. This was another case where he needed a very large skin surface to repair this very extensive defect.

Again, he did the same operation. This time he made the flap a little more slanting; in fact, he had to make a little turn in the pedicle and he wished to avoid that this time. He also went a little lower because he became more bold. There was no danger of its sloughing if one followed certain basic principles. He went below the clavicle, turned the flap of skin up and was able to do a blepharoplasty and rhinoplasty with the same operation from the same flap. He made a lower lid and a new nose. The skin grew perfectly without trouble, and he again followed the method of cutting off the bridge.

In the third case there was a severe gangrenous sloughing following an automobile accident in a boy, who was dragged along the street.

The fourth case was a severe burn, not as severe as in the case of the girl who had epilepsy, but this time he believed the operation was feasible and should be done. It was done, and was not followed by any special deformity because the collar concealed the wound and the subsequent scar very well, so he went in rather boldly. The only case in which he did not get a satisfactory result was in the case of the automobile injury, and the reason he thought was because he operated too soon, while there was still some slough; and he had to do another operation to correct the partial failure.

He published this operation in the Archives of Ophthalmology, and later in the Klinische Monatsblätter für Augenheilkunde.

Morax took up the operation and modified it. He thought the first case that Morax operated was one of a very severe loss of tissue in a sloughing nevus, one of those large nevi that covered the face. He presented a picture showing the operation Morax performed. Morax made the operation, and instead of throwing away the bridge which the speaker cut off, and throwing away the portion he did not use, he conceived the idea that when he had taken a flap from the neck, he turned it up, covered a part of the defect or as much as he could in the first operation, then instead of cutting this part off, throwing it away, he waited until circulation was established; he left it a little longer than Dr. Snydacker did. He took the other part and turned that up and covered the rest of the defect with a portion of the skin which Dr. Snydacker had thrown away.

Morax had performed this operation seven times, and he also found that while it seemed a severe procedure and a daring one to take flaps ten, eleven or twelve inches long, it could be done with perfect impunity. If one followed certain basic principles there was no danger of losing any of the flap, and furthermore, the resulting defect was less than by taking flaps from places where they could not be concealed. Where one took a flap from the neck the collar would conceal practically the whole wound. One could take large defects and cover them perfectly with plastic skin well adapted for the purpose, and do this without materially adding to the difficulty.

Delmasso in Madrid performed the operation successfully, also a German named Fulchen. An assistant of Morax had published an inaugural dissertation on this operation which he had done in his clinic and also a resumé of the cases on which they had operated by this method.

No one claimed that such an operation should be done for slight defect. To remedy the ordinary ectropion one would not go down and take a long flap of skin to remedy a slight defect, and the speaker said he had never claimed that this operation was adapted for such purpose, nor did he expect it would be used for such a purpose.

What he did claim was this: It was an operation which replaced the old Italian method, the Tagliocozzi operation, anchoring the arm to the head; especially in rhinoplasty, where they had to have a large skin surface, where they anchored the arm to the head for ten days, and made a bridge from the skin of the face or nose. The operation described was so much more practical, simpler and safer that it surely would in time displace that operation. This claim Morax had substantiated. It was a simpler operation to do than the old Italian operation. It was perfectly possible to do the operation without loss of flap which in a certain number of cases one was bound to lose in the Italian method; because where there was communication of the flap passing from the arm to the face, one was bound in a certain proportion of cases to have infection, no matter how carefully he protected the flap. One could not absolutely protect it.

If in making these flap operations one carefully measured the size of the defect that he wanted to cover and carefully marked out how far he wanted to go, and allow for a liberal shrinkage, say thirty to forty per cent, if one made the incision diagonally, following the sternocleidomastoid muscle, there was not much likelihood of a kink in the pedicle. If one would avoid kinking of the pedicle, if he was immaculately clean in his work, if the flap was made large enough so that there was no tension on it, it would take every time. There was no reason why a flap ten inches long should not take as well as one two inches long.

He thought the operation was better for rhinoplasty than for blepharoplasty, but one could combine the two as he had done in the lupus case. For these severe defects the operation was feasible and surely simpler and easier to do than the old Italian operation.

Discussion. — Dr. Dwight C. Orcutt asked Dr. Snydacker how he prepared the surface.

Dr. Snydacker replied that he made the ordinary preparation.

Dr. Orcutt asked whether he removed the skin of all the thickened tissues before he operated and how long before.

Dr. Snydacker said that it was necessary to dissect out all adhesions; that one had to put the lids on a stretch, and this was one of the hardest things to do. The lids ought to be sutured together for a number of weeks, six weeks was better than two or three weeks, but the longer one sutured the lids the better the result.

There was one difficulty in the operation he failed to speak about; one patient got a rather heavy upper lid; that is to say, the skin was a little heavy over the upper lid, and when one got thru there was a slight ptosis of the upper lid, but it was far better to have redundant heavy skin, and he would a good deal rather have ptosis than an ectropion which almost always recurred where one got too little. This was the difficulty in any flap operation on the upper lid, namely, that when one got thru he was apt to have a slight ptosis. There was no question that the Thiersch grafts in the first result gave nicer looking lids and better acting lids for the first few months. But any one who had seen much work done with Thiersch grafts knew where there were extensive defects, that in the end they shrank and degenerated and the result was unsatisfactory.

Dr. H. W. Woodruff, Joliet, Illinois, thought that the operation described by Dr. Snydacker would be very valuable in many of the severe cases that he spoke of. The speaker believed that ectropion of the upper lid could be repaired by the use of Thiersch grafts much more readily than the lower lid. In the lower lid one was more apt to have a return of the ectropion with Thiersch grafts but this did not apply to the same degree to the upper lid. The cases of destruction of the entire lid, both the conjunctiva and skin surfaces, would require something still further in order to make an eyelid.

The speaker saw something in the line of skin grafting in the work done by Dr. New in the Mayo Clinic which was exceedingly interesting. In repairing a nose Dr. New dissected a flap from the forehead, dissected the skin up, and put a Thiersch graft on the raw surface of the flap, so that he had a flap both surfaces of which were covered with epithelium. When the graft had taken, he swung this down to make a nose, so that he had both the internal and external surfaces covered with epithelium. It occurred to the speaker that this same scheme could be adapted to restoring eyelids, where it was necessary; as where the entire structure of the lid, both conjunctiva and skin had been removed for malignant growths or lupus.

Dr. Oliver Tydings said the society was to be congratulated on having the privilege of listening to the description of the operation of Dr. Snydacker, which was scientifically conceived and brilliantly executed with beautiful results. As he understood, the condition for which the operation was performed was not one where all of both eyelids had been lost, but distorted remnants of all tissues except skin remained; the muscle was still intact if not in place.

Dr. Snydacker said it was not to replace the cartilage.

Dr. Tydings said it could not replace cartilage or muscle; that a globe left exposed by accident or disease would be in great danger.

Dr. Snydacker said that in the automobile case in which there was sloughing a strip of cartilage with a few hairs was adherent, and he had something to anchor the skin to.

Dr. Tydings asked what protected the cornea.

Dr. Snydacker replied that the cornea was not injured.

Dr. Tydings asked about the length of the exposure of the globe, especially the cornea to the drying influence of air.

Dr. Snydacker replied that there was no long exposure.

Dr. Tydings said that if the musculature was preserved one had a base on which to work. The main point in the handling of these cases with ectropion was to keep as far away from the bony surface of the orbit as possible and dissect as close to the ciliary region, being careful not to injure the follicles of the hair bulbs, and not to disturb scar tissue beneath, where it was adherent to the bone, because many of these cases were attendant upon fracture, as observed by the late Dr. Beard, and by keeping away from the orbital walls one could obtain better results.

With regard to the use of the Thiersch graft on the upper lid, he had never had a failure. He had always covered it well. He recalled one particular case of a young woman, the whole lid was everted, the ciliary margin attached to the upper orbital wall, the conjunctiva and tarsal cartilage everted, and presenting an unsightly mass. The condition was due to an abscess occurring in childhood. By dissecting close to the ciliary body and making as large a flap as he could, from above, dissecting the surface free and using a Thiersch graft he got a beautiful result. The only trouble was, it was in a colored woman and the skin he took from the inner side of the arm when exposed to the sun, turned black and looked as if painted. Ultimately it faded out and was not observable, or not as markedly as in the first place. He had never had occasion to employ the extensive grafts, but if he had he would follow the suggestion and work of Dr. Snydacker.

There was one point he desired to speak of, and this was concerning the case of lupus that had been treated with unfortunate results by the X-ray, which treatment had caused an X-ray burn. One could get results every time in treating lupus by the use of tuberculin. He could arrest the progress with tuberculin, and he had never seen it fail in a case of lupus. It was lupus that first attracted his attention to the use of tuberculin.

Dr. Richard J. Tivnen emphasized the importance of the dressing used in these cases. There was no class of work in his judgment where there was so much attention to detail demanded as in cases of skin grafting. Among the essential details one of the most important was the aftercare and the method of dressing. It was the general impression among surgeons that grafts prosper better without any dressing, that is, the "open method." His own experience had taught him the advantages of the open method of dressing and he now used it entirely.

Dr. Snydacker stated, in reference to the use of grafts on the lid, that for smaller degrees of ectropion he had resorted to a little operation which he reported a few years ago. He had found it so simple, so easy and so certain in the smaller degrees of ectropion that he had been using it since then. Where he had a lower lid to deal with he repaired the defect in one lid by using the skin of the other lid. He made a circular flap and used skin, following the lines of the orbicularis and anatomic lines. If he wished to repair the lower lid he loosened the outer angle of the eyelid; he destroyed the hairs at the edge of the lid; he dissected or loosened the skin of the upper lid by means of a Graefe knife for a short distance, drew down the upper lid, brought the circular flap in place and replaced it. The ectropion could not return because the lines of shrinkage were in the opposite direction to the ectropion.

Influenza as a Causative Factor in Acute Glaucoma.

Dr. Dwight C. Orcutt said that during the last few months, since the prevalence of influenza, there seemed to have been a larger number of cases of glaucoma observed at the Infirmary. About Christmas and during January there was a marked increase. He had seen more of the sequelae of influenza in the various conditions which he handled, such as headache, transitory diplopias, than ever before in the same length of time, so that he began to inquire among the cases of glaucoma and found that the majority of them gave a history of having had influenza during the fall or winter that was followed by a glaucomatous attack, in some instances immediately.

Reasoning from analogy the recent contagion was of the edematous type. Of the pneumonia patients who died, many died of acute edema. When one was called in to see cases of influenza he observed puffy, edematous conditions of the body. There was a stasis of the circulation, and glaucoma being a circulatory disease, the circulation being very poor, produced the glaucoma. So that he brought this subject up to find out what the experience of other members might have been during the past few months in regard to glaucoma.

Dr. Munns had the data taken from the histories of patients at the Infirmary, and thru the kindness of other members of the staff they had been able to get a list of the cases they found during the past six months, and in comparison with them they had gone back over a period of some four or five years trying to find out the number of cases of glaucoma.

Dr. Shirley Bogart Munns stated the standard textbooks on diseases of the eye mentioned influenza as an exciting cause of glaucoma. With this in mind one should not expect a paper dealing with glaucoma in relation to the recent influenza epidemic to be in any way startling.

In comparing the cases of glaucoma admitted to the Illinois Charitable Eye and Ear Infirmary during the months beginning September 1st, 1918, and ending March 31st, 1919, with those admitted during the corresponding 7 months of the 3 preceding years, one finds a great increase in the acute form during the past 7 months. To simplify the classification, the simple chronic cases, of which there were very few, and the chronic inflammatory cases were classed under one head as chronic. In 1915-16, 14 per cent of the cases of glaucoma were acute; in 1916-17, 26 per cent were acute; in 1917-18, 20 per cent were acute, and in 1918-19, 60 per cent were acute.

During the past seven months there were 13 cases of acute glaucoma admitted to the Infirmary and 9 cases of chronic glaucoma. Of the 13 acute cases, 8 gave a history of the so-called Spanish influenza preceding the onset, one followed an attack of erysipelas, another had at the time of entrance a late secondary syphilid and a four plus Wassermann, while another proved to be a diabetic. The two other acute cases gave no history which would suggest an exciting cause. Only two of the nine chronic cases gave a history of Spanish influena immediately pre-

[illegible]

[illegible]

[illegible] place.

Dr. Snydacker [illegible] was not to re- [illegible]

[illegible] that a globe left [illegible] accident or disease would [illegible]

Dr. Snydacker said that in the autopsy [illegible] case in which there was sloughing [illegible] cartilage with a few hairs was adherent and he had something to [illegible]

Dr. Tydings asked what protected the cornea.

Dr. Snydacker replied that the cornea [illegible]

Dr. Tydings asked about the length [illegible] exposure of the globe, especially [illegible] the drying influence of [illegible]

Dr. Snydacker replied that there was [illegible] exposure.

Dr. Tydings said that if the musculature was preserved one had a base on which to work. The main point in the handling of these cases with exenteration was to keep as far away from the bony surface of the orbit as possible and dissect as close to the ciliary region, being careful not to injure [illegible] of the hair bulbs, and no [illegible] scar tissue beneath, wh [illegible] was adherent to the bone, [illegible] of these cases were a [illegible] fracture, as observed by Dr. Beard and by keeping away from the orbital walls one could obtain better results.

In regard to the use of the Thiersch graft on the upper lid, he had never had a failure. He had always [illegible] it well. He recalled one particular case of a young woman, the whole lid was everted, the ciliary margin attached to the upper orbital wall, the conjunctiva and tarsal cartilage everted and presenting an unsightly mass. The condition was due to an abscess occurring in childhood. By dissecting close to the ciliary body and making as large a flap as he could, from above, dissecting the surface free and using a Thiersch graft he got a beautiful result. The only trouble was, it was in a colored woman and the skin he took from the inner side of the arm when exposed to the sun, turned black and looked as if painted. Ultimately it faded out and was not observable, or not as markedly as in the first place. He had never had occasion to employ the extensive grafts, but if he had he would follow the suggestion and work of Dr. Snydacker.

There was one point he desired to speak of, and this was concerning the case of lupus that had been treated with unfortunate results by the X-ray, which treatment had caused an X-ray burn. One could get results every time in treating lupus by the use of tuberculin. He could arrest the progress with tuberculin, and he had never seen it fail in a case of lupus. It was lupus that first attracted his attention to the use of tuberculin.

Dr. Richard J. Tivnen emphasized the importance of the dressing used in these cases. There was no class of work in his judgment where there was so much attention to detail demanded as in cases of skin grafting. Among the essential details one of the most important was the aftercare and the method of dressing. It was the gen- [illegible] ong surgeons [illegible] with [illegible]

Dr. Snydacker stated, in reference to the use of grafts on the lid, that for smaller degrees of ectropion he had resorted to a little operation which he reported a few years ago. He had found it so simple, so easy and so certain in the smaller degrees of ectropion that he had been using it since then. Where he had a lower lid to deal with he repaired the defect in one lid by using the skin of the other lid. He made a circular flap and used skin, following the lines of the orbicularis and anatomic lines. If he wished to repair the lower lid he loosened the outer angle of the eyelid; he destroyed the hairs at the edge of the lid; he dissected or loosened the skin of the upper lid by means of a Graefe knife for a short distance, drew down the upper lid, brought the circular flap in place and replaced it. The ectropion could not return because the lines of shrinkage were in the opposite direction to the ectropion.

Influenza as a Causative Factor in Acute Glaucoma.

Dr. Dwight C. Orcutt said that during the last few months, since the prevalence of influenza, there seemed to have been a larger number of cases of glaucoma observed at the Infirmary. About Christmas and during January there was a marked increase. He had seen more of the sequelae of influenza in the various conditions which he handled, such as headache, transitory diplopias, than ever before in the same length of time, so that he began to inquire among the cases of glaucoma and found that the majority of them gave a history of having had influenza during the fall or winter that was followed by a glaucomatous attack, in some instances immediately.

Reasoning from anal [illegible] contagion was of the e [illegible] Of th [illegible] mar [illegible] monia pati [illegible] wa [illegible] ute ede [illegible] he [illegible] ee ca [illegible] io [illegible] , e [illegible] Th [illegible] nd

coma. So that he brought th up to find out what the exp other members might have ing the past few months in glaucoma.

Dr. Munns had the data tak the histories of patients at the ary, and thru the kindness o members of the staff they ha able to get a list of the cases they during the past six months, a comparison with them they had back over a period of some four o years trying to find out the numb cases of glaucoma.

Dr. Shirley Bogart Munns st the standard textbooks on diseases of eye mentioned influenza as an excit cause of glaucoma. With this mind one should not expect a pap dealing with glaucoma in relation the recent influenza epidemic to be i any way startling.

In comparing the cases of glaucoma admitted to the Illinois Charitable Eye and Ear Infirmary during the months beginning September 1st, 1918, and ending March 31st, 1919, with those admitted during the corresponding 7 months of the 3 preceding years, one finds a great increase in the acute form during the past 7 months. To simplify the classification, the simple chronic cases, of which there were very few, and the chronic inflammatory cases were classed under one head as chronic. In 1915-16, 14 per cent of the cases of glaucoma were acute; in 1916-17, 26 per cent were acute; in 1917-18, 20 per cent were acute, and in 1918-19, 60 per cent were acute.

During the past seven months there were 13 cases of acute glaucoma admitted to the Infirmary and 9 cases of chronic glaucoma. Of the 13 acute cases, 8 gave a history of the so-called Spanish influenza preceding the onset, one followed an attack of erysipelas, another had at the time of entrance a ute secondary syphilid and a four plus Wassermann, while another proved to e a diabetic. The two other acute ases gave no history which would uggest an exciting cause. Only two the nine chronic cases gave a history Spanish influena immediately preceding an acute exacerbation. There were twice as many cases of secondary glaucoma during the past seven months as there were during the same period in any of the three preceding years.

In the acute inflammatory variety of glaucoma which we were considering in this paper, the pathologic condition was classified as an inflammatory edema. Not only was the actual fluid increased in amount, but the very vascular uveal tract was edematous thruout. Now Spanish influenza was *per se* a disease of edema. If the toxin would so alter the vessel wall that the blood serum would pass too rapidly into the surrounding tissues, was it not possible that this might occur in the uvea? Extensive involvement of the lungs obstructed the pulmonary circulation and thus produced venous stasis which might tend to favor the production of glaucoma. Atropin was the one great drug used during the recent epidemic. It was given in larger and more frequent doses than ever before. It was not uncommon to find the patient with atropin mydriasis. Could not this have been a causative factor in the production of glaucoma? Producing mydriasis by dropping atropin into the conjunctival sac of persons over forty was a dangerous procedure. All of the cases they had of acute glaucoma complicating Spanish influenza were over forty years of age.

Returning to the statistics, 5 of the 13 cases of acute glaucoma did not bear any relation to the recent epidemic. With only 5 acute cases the proportion of this type was reduced to that of the three preceding years. Thus it could be assumed that the 8 cases, while probably predisposed to glaucoma, were directly excited by an attack of Spanish influenza.

Discussion.—Dr. Clarence Loeb stated that the remarks of the previous speakers would seem to show that there was some relationship between so-called influenza and acute glaucoma. In speaking of this one should be very careful to distinguish between the influenza we knew a great many years ago and the influenza that occurred in the last year. The former was the product of the influenza bacillus, whereas the latter was an entirely distinct disease so far as we had been able to learn from internists. Therefore, he thought in the title of the paper a distinction should have been made between former influenza and the so-called Spanish influenza.

Dr. G. Henry Mundt said he would like to know whether any difference was noted in the efficiency of the treatment of the 8 cases reported with eserin or operation. The theory or supposition was that eserin was probably less efficacious than in the ordinary type of glaucoma. The speaker had seen some cases of glaucoma following or during an attack of so-called Spanish influenza, two of them were acute and one noninflammatory which developed during an acute attack of influenza.

He thought the members should be very cautious about saying much regarding the use of atropin precipitating glaucoma. He did not know whether it did or not, and he would like to hear the experience of others in regard to precipitating glaucoma by the use of astropin.

Dr. Harry M. Ivins, Cedar Rapids, Iowa, said he had had a few cases of acute glaucoma during the winter months when the influenza was quite prevalent. Whether or not the influenza had anything to do with producing the glaucoma he could not say. He had not thought of it in that light. As to the use of atropin in producing or precipitating glaucoma, he had always supposed that glaucoma could be caused and was caused by the use of atropin.

He recalled the case of an old gentleman who was working in the Masonic Temple at Cedar Rapids and was seized with a severe pain in his eye. He went to the family physician who supposed that the man had an iritis. He put atropin in the eye, and before the doctor discovered what had happened the man was blind in that eye, and later became blind in the other eye and today is totally blind. This was an instance where a man went blind following the use of atropin, altho it did not prove he did not have glaucoma in the first place or would not have had it and would not have been blind.

Dr. Thomas O. Edgar, Dixon, Illinois, in reply to the question of Dr. Mundt, cited a case of irido-cyclitis, that he had recently observed, in which atropin was indicated, but, almost every time it was used the tension went up temporarily; and when atropin was discontinued the tension would go down. On the other hand, during an exacerbation of a case of chronic irido-cyclitis, with extensive posterior synechiae, the use of atropin caused the tension to become normal again, undoubtedly because it loosened up the adhesions. Such experiences were not isolated.

Dr. Oliver Tydings said it would be unfortunate to let it go out that it was the consensus of opinion that atropin was not contraindicated in suspected cases of glaucoma. He had not had any experience in seeing glaucoma precipitated by the use of atropin, but he recalled some cases that were attributed to it.

The only fulminating case of glaucoma he ever saw was when he was called to see a patient for the first time, who said she had not felt well for a day or two, but had not called a doctor until she noticed she could not see. This was about 8 P. M., and he asked for an immediate operation, this was declined. Consultation was granted, and both eyes operated upon the next morning before 6 o'clock. The patient was stone blind at the time of the operation, and was until her death some years later, and she had not had sufficient trouble before that evening to call a physician. There was no history of the use of atropin, or that she had used any domestic remedy which could be suspected of cycloplegic action. This was not a case where vision had been lost as a result of hemorrhage followed by glaucoma. Gifford, of Omaha, had reported a number of cases of glaucoma following the use of homatropin. The speaker saw one case in a young woman, twenty-one or twenty-two years of age, who was absolutely blind in one eye. He saw her after she had been blind in one eye five years which she attributed to some drops that were instilled into the eye at the Illinois Charitable Eye and Ear Infirmary. She did not know anything about this, but he knew the girl was blind in one eye from glaucoma.

If the colloid theory of Fischer, of Cincinnati was right, the speaker thought that anything which would tend to produce mydriasis or would interfere at all with the drainage system, would produce glaucoma. He certainly would not want atropin instilled into his own eyes if he had glaucoma.

Dr Mundt said he hoped none of the members misinterpreted what he had said. He simply asked whether any member knew of a case of glaucoma that was precipitated by the use of atropin or any other mydriatic.

Dr. Clarence Loeb said that several years ago he had a case of glaucoma simplex which was very well controlled by the use of the ordinary miotics. One day the patient consulted him, and the eyes were found in good condition. Another prescription for pilocarpin was given him. His eyes were much worse that afternoon, after using one drop of the new medicine, and they became suddenly very much worse. He found this man was suffering from an attack of acute glaucoma. He looked up the prescription and on it was written two per cent pilocarpin. The druggist stated absolutely that the prescription was filled as written, but the same medicine was used as a control in a rabbit and it produced dilatation of the pupil. He did not know whether atropin or hometropin was used, but certainly one of them was given instead of the pilocarpin that was prescribed, and there was no question that it caused an acute glaucoma.

Dr. N. C. Nelson stated that at the Infirmary he had taken the blood pressure and intraocular tension in about 75 cases before operation. They found quite a number of patients that had developed glaucoma who had a high pulse pressure and showing that the intraocular tension was increased. Very high pulse pressure was very often found even if the intraocular tension was not increased at the time the blood pressure was taken but would develop an increased tension after operation. They found that a patient might have a high blood pressure (systolic) the pulse pressure being normal; also that a patient could have a normal blood pressure (systolic) according to his age, but have a high pulse pressure.

He thought that if all cases were followed up closely; and blood pressure and intraocular tension taken in all cases before operation, one would find there was a glaucomatous condition present already, and any operation or traumatism to the eye helped to precipitate a latent glaucoma. This condition was probably due to the whole system undergoing the same changes as those that produced arteriosclerosis. They had not as yet worked out as many cases as they would like to do, but so far as they had gone there seemed to be a very close relation between the high pulse pressure and glaucoma.

Dr. Orcutt, in closing, stated that the sooner one operated on a case of acute glaucoma, the sooner he would save the eye. If one could gain the consent of a patient suffering from acute glaucoma, with a tension above 35, his advice was to operate, as one would be able to save a good useful eye.

The operation he had been following almost entirely was trephining, and during the past year he had not had one failure in his service from trephining. He had had one case of an old chronic glaucoma in one eye, and an acute condition in the other eye, in which the glaucoma recurred in the chronic case. A second trephining was done on the lower portion and the eye had been all right since.

The worst case he had ever had was one in which atropin was used. He finally resorted to operation and the patient recovered with fairly useful vision. Glaucoma might develop in iritis or uveitis where atropin was used due to the adhesions interfering with circulation of the eye.

Dislocation of Both Lenses.

Dr. Oliver Tydings exhibited and reported a case of dislocation of the both lenses in a Sister, thirty-five years of age. The pupil was not widely dilated. He had not examined the case for three or four weeks. He had used cocain three times since coming here but had not been able to secure much dilatation of the pupil. There was no irregularity of the pupil. Last July the patient came to him with the lens dislocated in each eye. At that time the zonule was not broken above but the lens was dislocated temporarily in each eye. Patient was fitted with glasses some years before and was wearing minus ten or eleven, he did not remember which. After advising her to be operated on, he did not see the patient any more until about a month ago. When she came back the lens was not only broken towards the nasal side but the zonule above was broken. In the meantime the patient had gone to an optometrist in Indiana who succeeded in fixing up a pair of glasses for twenty-two dollars, and they were plus. They were cataract lenses.

He would like the members to examine the case and offer suggestions as to treatment.

Discusion. Dr. Orcutt said he had had the case of a boy with both lenses dislocated upwards. In this case he needled them.

Embolism of the Central Artery.

Dr. D. C. Orcutt exhibited and reported the case of a man who, while sweeping, suddenly became blind two weeks ago. When admitted to the Infirmary he was just able to see his way about. As he had not the history of the case he was not able to say definitely what the man's vision was; but there was every indication that this was a case of embolism of the central artery. Both arteries were shrunken. The fundus was white. There was a bright red spot in the macula. The urine showed the presence of albumin. He had a blood pressure of nearly 200. He had not made a positive, but simply a tentative diagnosis of embolism of the central artery.

Cyst Occupying the Region of the Lacrimal Sac.

Dr. Clarence Loeb reported the case of a man who gave the history that he awoke one morning with a severe inflammation of one eye with swelling, which lasted two days. This swelling was situated over the lacrimal sac and was about the size of a lima bean. It had a resistant feeling such as a sebaceous cyst would give. Was this a case of sebaceous cyst or one of dacryocystitis?

Discussion. Dr. Michael Goldenburg did not think Dr. Loeb's case was one of sebaceous cyst, but an anomalous development of the anterior ethmoid cells. The walls of the ethmoid cells were very thin, at times, and on blowing the nose one could notice swelling. He had had three such cases in which the anterior ethmoidal cell was involved. If one applied firm pressure over the swelling it would evacuate it.

He saw one case of swelling of the lacrimal sac in which no pus could be expressed. He irrigated the sac and forced fluid into the nose quite freely. An incision was made in the region of the sac and the sac was found to be normal. In one case he followed the sac along the orbital wall for about one and a half inches and into the ethmoid, made a good big hole, and closed it up anteriorly, compelling it to drain into the nose.

BALTIMORE CITY MEDICAL SOCIETY.

OPHTHALMOLOGICAL SECTION

March 19, 1919.

Dr. Downey presiding.

Base Hospital Unit.

Dr. Whitham read a paper on the history of the eye department of the Johns Hopkins Base Hospital Unit, from its arrival in France with the first convoy of American troops in June, 1917, until its enlargement into the newly formed opthalmic center in April, 1918, and described the growth and development of the latter institution, with a sketch of its purpose and the scope of its activities from that time until his departure for America on February 1, 1919.

Detachment of the Retina in Eclampsia.

Dr. Clapp read the paper published in full p. 473.

In discussion Drs. Harlan, Randolph and Fleming stated that they had never seen such a condition.

Albuminuric Retinitis.

Dr. Clapp then exhibited a fundal drawing of a case of acute albuminuric retinitis, which was very atypical. At each macula was a central pearly white mass surrounded by a yellowish white exudate; the right eye showed more advanced stage than the left; left macula showed some fat globules above surface of retina.

Neuroretinitis.

Dr. Downey presented a drawing of a case of acute neuroretinitis, which was found later to be specific.

Recovery of Sight After Injury.

Dr. Harlan reported a case of a gun-shot injury with the shot remaining in the eye, as shown by x-ray. He had given an opinion that the eye was lost; but recently had seen the patient and with a correcting glass the individual had a vision of 20/30.

C. A. Clapp, Secretary.

ABSTRACTS

Ramsay, A. Maitland.—Treatment of Prolapse of Iris. (British Journal of Ophthalmology, Nov. 1918, p. 554.)

This article presents a very good resumé of the usual methods of treating prolapse of the iris, with variations depending upon whether the case is one of recent origin or more than forty-eight hours standing, and whether the prolapse is due to a penetrating wound of the cornea or the result of a perforating ulcer of the cornea.

In speaking of quite recent prolapse

due to penetrating wounds of the cornea, Ramsay points out that such conditions may be overlooked by the inexperienced, since the grey color of the iris is difficult to see; that, however, the shape of the pupil is always altered, pear-shaped with the narrow part pointing to the prolapse; that the endeavor should be made to draw the iris out of the wound and back into the anterior chamber by atropin or eserin according to whether the wound is central or peripheral, but that this endeavor is not often successful since the bruised iris has lost its elasticity and is easily drawn into the wound after replacement and thus form an anterior synechia even though it does not prolapse again; and that, if replaced, infection may be carried into the eye. All things considered, therefore, believes careful excision to be the best treatment for a recent prolapse.

After excision of the prolapse in such cases, and coaptation of the edges of the wound, the latter is covered with a conjunctival flap brought from the limbus in the neighborhood of the wound. After the parts have been carefully dried, a coating of paraffin is applied to seal the edges of the flap to the cornea and give additional protection to the wound; the paraffin employed is a substitute for ambrin and is known as No. 7; it is non-irritating to the eye and is readily applied in the liquid state by a medium-sized camel-hair brush; it becomes solid almost immediately.

When the wound implicates the sclera as well as the cornea and the prolapse includes the ciliary body and cornea as well as the iris, with loss of vitreous, no speculum should be employed but the upper lid be held back with retractor or strabismus hook. The bulbar conjunctiva should be separated from the posterior lip of the wound, and undermined freely for a considerable distance around the seat of injury. The whole of the prolapse uvea must now be carefully excised, and the lips of the wound approximated by drawing the conjunctiva over the cornea like an apron, and fixing it securely in its new position by as many sutures as may be required—the fewer, however, the better. No attempt ought to be made to stitch the sclera.

Next he considers the treatment of prolapse following penetrating wounds which has existed several days, pointing out the necessity of breaking down adhesions and the difficulties connected with such separation, and also the necessity for avoiding the entrance of sepsis into the interior of the globe. When the prolapse is small, it may be wisest to leave it alone altho the subsequent danger of secondary glaucoma and the liability to future infection must be remembered; on this account it is advised to deal surgically with such prolapses, if prudent to do so, by separating the iris from the lips of the wound and excising and then removing any tags of iris tissue left behind with fine forceps or scissors. If the edges of the wound show signs of septic infection they should be touched with the galvanocautery, and afterwards covered with a conjunctival flap. In such cases, the writer is in the habit of giving 4,000 units of antidiphtheritic serum subcutaneously and a second dose of half this amount twelve hours afterwards; he has seen favorable results following the use of serum and advises its use confidently in all cases where the eyeball is infected.

Finally, the treatment of prolapse due to perforating ulcer of the cornea is considered; this complication may follow the perforation of any cornea ulcer but occurs most frequently in the marginal ulcer seen in phlyctenular keratitis in children. In such cases the opportunity for simple excision rarely presents itself since the ophthalmic surgeon does not, as a rule, see the child until several days after the perforation has taken place. Under such circumstances, a small prolapse is found covered with exudate, speedily transferred into connective tissue, and the only prudent treatment is to leave the case to nature. When, however, the prolapse is large, the remains of the cornea and newly formed connective tissue are not strong enough to withstand the force of the intraocular pressure, so, instead of the prolapse flattening, it bulges forwards, and unless something can be done to arrest it, the eye will be destroyed by anterior staphyloma or by general distension of the globe; in such cases the expectant plan of treatment is unsuccessful and an attempt should be made to reduce the prolapse and to strengthen the cicatrix. The night before the operation the conjunctival sac is filled with White's ointment (1:3000 bichlorid) and at the time of the operation the skin of the eyelids and surrounding parts is painted with iodin. The conjunctiva is then seized by forceps and divided with scissors at the sclerocorneal border in the neighborhood of the prolapse, and separated freely from the episcleral tissues. The prolapse is now burned down to the level of the cornea by galvanocautery, heated to a dull red, care being taken not to destroy the exudate which seals the iris to the substance of the cornea, and if possible the anterior chamber should not be emptied. The conjunctiva which has been separated from the eyeball is then drawn over the prolapse and the ulcer of the cornea, so as to cover them completely. While the flap is held in position by two pairs of forceps, a small piece of conjunctiva should be excised on either side, in order that, when the sutures are tied, two raw surfaces are approximated; this prevents the flap from slipping back into its former position and greatly assists the whole object of the operation which is to bring about the firm healing of the flap of conjunctiva, the cauterized surface of the iris and the edge of the ulcer of the cornea. The conjunctiva supporting the cornea should be covered by a layer of paraffin, atropin instilled, followed by a disc of ten-per-cent collargol gelatin. In several weeks healing will have taken place, but secondary glaucoma may supervene; hence iridectomy should be performed. When the iris is drawn towards the cicatrix so that the pupil is obstructed, the iridectomy should be placed so as to give the most satisfactory optical result. Even at best, however, vision is seriously impaired, and in cases of deep ulcers of the cornea every effort ought to be made to prevent accidental perforation by timely paracentesis of the cornea through the floor of the ulcer; by that means prolapse of the iris will be prevented and the formation of anterior staphyloma avoided.

C. H. M.

Morax, Moreau, and Castelain.—Types of Alteration of Macular Vision in Traumatic Occipital Lesions. Ann. d'Ocul., 1919, v. 156, p. 1.

The authors describe the lesions seen since 1914, using the method of examination described by Moreau. (Ann. d'Ocul., 1918, v. 155, p. 357.) The great difference between traumatic hemianopsia and that due to vascular or meningeal lesions is that in the former there is initial great intensity of functional disturbance, a complete blindness which may last days or weeks, to be replaced months later by circumscribed loss of function in the form of a scotoma, often very limited, in similar parts of the visual fields. Once established, this does not change, the hemianopsia remaining a permanent lesion. The patients described were examined in this stage, and were 88 in number, comprising only those where the trauma affected the occipital centers and not the fibers elsewhere, e. g., the chiasm.

The functional ability of the retina may be divided into three zones, (a) the zone of fixation, corresponding to the macula, 1.5° to 2°; (b) the central zone, corresponding to the macula, about 10°; and (c) the peripheral zone, the rest of the retina. The present article deals with lesions affecting only the first two zones. Lesions of the right hemisphere cause left homonymous hemianopsia; while lesions of the left hemisphere cause right homonymous hemianopsia. To produce bilateral homonymous hemianopsia, a lesion of both hemispheres is necessary.

There are seven types of hemianopsia summarized in the following table:

TYPES OF HEMIANOPSIA.

I. Homonymous hemianopsia, 27 cases.	
A. Not affecting macular vision	19 cases
B. Affecting macular vision	8 cases
I.. Sector hemianopsia, 18 cases.	
1. Inferior	
A. Not affecting macular vision	6 cases
B. Affecting macular vision	8 cases
2. Superior	
A. Not affecting macular vision	1 case
3. Double inferior	
A. Not affecting macular vision	3 cases
III. Hemianopic scotoma, 20 cases.	
1. Median type	
A. Without macular involvement	1 case
B. With macular involvement	4 cases
2. Inferior sector	
A. Without macular involvement	3 cases
B. With macular involvement	4 cases
3. Double sector	
A. Without macular involvement	4 cases
B. With macular involvement.	1 case
IV. Homonymous hemianopsia with hemianopic scotoma of the opposite side, 14 cases.	
A. Without macular involvement	4 cases
B. With macular involvement	10 cases
V. Double hemianopic scotoma, 4 cases.	
1. Median	2 cases
2. Inferior	2 cases
VI. Homonymous hemianopsia with central scotoma	2 cases
VII. Blindness	1 case
	86 cases

Each type is illustrated by one or more case histories with fields of vision, and drawings indicating location of the cranial wound. C. L.

Cantonnet, A.—The "Hole in the Hand" Test of Binocular Vision. Med. Press, Oct. 23, 1918.)

The writer describes an amusing physical phenomenon which he considers an excellent means of guaging binocular vision: If a cardboard tube or roll of paper is held before one eye, the right for example, and the left hand is placed open about ten inches before the left eye, the right eye will see whatever is visible thru the lumen of the tube, while the left eye sees only the hand; the images of the two eyes are fused in the brain, and we get the impression that the left hand has a hole in it thru which we see the objects comprised in the field of vision as seen thru the tube.

Cantonnet uses this test not only for the purpose of proving binocular vision, in which case both the tube objects and the hand must be seen, but he employs it to detect heterophoria: If the tube is seen to the right of the center of the hand or to the right of the hand, this indicates excessive convergence; if the hole is seen on the left side of the hand or to the left of the hand, this shows divergence; if the hole is displaced perpendicularly, a vertical deviation exists.

This test is recommended as simple and sensitive especially as a means of diagnosis at the disposal of the general practitioner, though he also finds it of great service in the treatment of strabismus at all stages. C. H. M.

J. E. L. Kraft and **G. ten Doesschate.—Treatment of Gonorrheal Ophthalmia by Diathermia.** (Tydschrift, f. Geneesk, July 21, 1917.) These authors report three cases.

The patients were treated with the large instrument of Koch and Storzel, which receives an alternating current of about 150 volts, with 50 alternations in the second. This current comes from the street current, a direct current of 220 volts, thru a special transformer. The instrument is regulated in the primary and secondary diathermia current. The regulation of this last one depends on the sensibility of the patient, with consideration of possible diminishing of the heat sense. The electrode which is put on the eye is made from solid metal and bent so that the surface conforms to the front of the eyeball. Between the lids and electrode a thin layer of cotton, wet in salt solution, is put. The other (lead) electrode is tied around the patient's neck.

It is most probable that the success is due to the heat development with its successive hyperemia, as nothing is seen of electric reactions.

Case 1. Eighteen years old, treated for gonococcal urethritis since Nov. 27. On Dec. 9 L. E. became inflamed. Next day he was sent to Utrecht. Treatment with 2% Arg. nit., 10% protargol and 1/5000 potas. permang. The right conjunctival sac became also infected, but was well again after a few days. In the left appears, especially at the upper side of the cornea, a strong chemosis, so that this is covered half way. An ulcer followed, the keratitis kept growing in severity, and gonococci were continuously found in the pus.

On Dec. 23 L. E. was treated with thermopenetration, current less than ½ ampere. After three hours the chemosis had nearly disappeared.

Dec. 24, there was no more secretion of pus; no chemosis, the cornea had cleared. After two more treatments, of 15 minutes duration, the patient was discharged cured.

Case 2. Two years later a second patient was treated. March 13, a 26 years old man showed a gonorrhoic inflammation of L. E. without symptoms of urethritis. He came under treatment on March 24 with L. E. V = 1/200; perforation of cornea and prolapse of iris; R. E. V —5/5. L. E. kept secreting pus containing gonococci in spite of diathermia treatment. On March 26 R. E. showed pus with gonococci, with lowered vision. Two hours after the first diathermia treatment (during 15 minutes) no gonococci were found in the quickly diminishing pus. R. E. was cured quickly, while it took about 10 days to sterilize L. E.

Case 3. Man 24 years old had for 6 days pain in L. E., and since 4 days of R. E. in connection with gonorrhoic urethritis. The patient came with a large deep ulcer of L. E. Besides the usual treatment he received daily diathermia treatment; but the number of cocci in the pus hardly diminished. The skin of the eyelids was strongly macerated thru preceding moist compresses, which prevented reaching high temperature, on account of pain. In the night of April 14 the ulcer of O. S. perforated, after this no gonococci could be demonstrated. They continued a few in R. E.; but disappeared after starting diathermia again, which had been stopped during some days for some accidental reasons. E. E. B.

Medical Inspection of Schools in New Zealand. (The Medical Journal of Australia, 13-4-18).

From 1912 to 1916 six doctors examined 100,000 children. From 7% to 10% of the children have defective vision. The inspectors notify the children as defective when they read less than 6/9 in each eye with Snellen's test-types. As usual more defective sight is found in the upper classes. Owing to various causes the child is compelled to choose between no treatment at all or treatment by an unqualified optician. It is suggested children's clinics should be established in connection with the out-patient departments of the hospitals. For country children no scheme has as yet been evolved F. P. M.

American Journal of Ophthalmology

Series 3, Vol. 2, No. 7 July, 1919

PUBLISHED MONTHLY BY THE OPHTHALMIC PUBLISHING COMPANY

EDITORIAL STAFF

ADOLF ALT,
Metropolitan Bldg., St. Louis, Mo.
M. URIBE-TRONCOSO,
143 W. 92nd St., New York City.
MEYER WIENER,
Carleton Bldg., St. Louis, Mo.
CASEY A. WOOD,
7 W. Madison St., Chicago, Ill.
HARRY V. WÜRDEMANN,
Cobb Bldg., Seattle, Washington.
EDWARD JACKSON, *Editor,*
318 Majestic Bldg., Denver, Colo.
CLARENCE LOEB, *Associate Editor,*
25 E. Washington St., Chicago, Ill.

Original papers and books for review may be sent to any member of the editorial staff. Reports of society proceedings, correspondence, and other scientific communications should be addressed to the Editor.

Proof should be corrected and returned within forty-eight hours to the printer. Reprints may be obtained from the printers, Tucker-Kenworthy Co., 501 S. La Salle St., Chicago, Ill., if ordered at the time proofs are returned.

Subscriptions, applications for single copies, communications with reference to advertising or other business, should be addressed to
H. A. FOX, Manager, 7 West Madison St., Chicago, Ill.

THE ABUSE OF CANALICOTOMY IN SIMPLE EPIPHORA.

Is there or is there not a tendency among the rank and file of Ophthalmic Surgeons toward sane and safe treatment of lacrimal diseases, especially the simple forms of lacrimal obstruction? The conservatism of the Philadelphia Surgeons, the radicalism of Baltimore and of some Surgeons in the Middle West, are the extremes.

Is there no safe middle ground? Yes:— The treatment is drainage, first, last and all the time, but anatomic drainage and not artificial drainage. Why is canalicotomy for epiphora so often performed in these more enlightened days, when the cause, be it conjunctivitis with excess of tears and thickened secretions, punctal obstruction, lacrimal sac catarrh, closure of the saccal or nasal ends likely due to hypertrophied turbinals or deflected septum leading to obstruction, may and should be first removed before radical procedures are performed upon the tear passages?

Certainly if probing is to be resorted to, dilatation of the punctum is the first step, to be followed by syringing with mild solutions. If cocain with adrenalin then be injected into the sac, large sized probes, even No. 8 Bowman, 6 Fox or 4 Theobald may be passed without pain and without resort to the unwarranted slitting of the canaliculus. These sounds are as large as the normal bony canals will contain. Then after removal of the ocular or nasal cause a practical cure will ensue.

The lacrimal puncta are not only the beginning of the sewer system for the drainage of the tears and mucous secretions, but the canaliculi form with these entrances a very perfect capillary, gravity and suction pump apparatus, the latter acting both by the ring muscle around its lumen and by the pressure massage of the movements of the lids. All but the open sewer gravity functions of the lacrimal passages are destroyed by the transformation of this tube into a slot by slitting the canaliculus by the Weber, Bowman or Stilling knives. Canalicotomy should not be done except in the presence of pus in the sac, and for that not very often.

H. V. W.

THE ATLANTIC CITY MEETINGS

It is safe to say that the gathering of Ophthalmologists in the Section on Ophthalmology of the American Medical Association, June 11-13, at Atlantic City, was the largest gathering of the kind that will be held this year anywhere in the world. There were more than 450 who registered their attendance, about one-tenth of the total registration of the Association; and among those who registered with the Section on Laryngology, Otology, and Rhinology were many who divided their time between the meetings of the two sections.

The meetings of the American Ophthalmological Society which followed, June 14-17, were smaller, about 120 registered; but were of equal scientific interest and importance. This oldest American organization of specialists seems largely to have recovered its scientific activity, after the depression incident to the absence of members in military service.

In the programs of both meetings war requirements, emergencies and experiences furnished the dominant interest. Almost half of those whose names appeared upon the programs had been in active service, and nearly all the others had been serving on the various boards and units for the examination of recruits. While war experiences have been the basis of so many of the papers presented and discussed at these meetings, the more complete history of ophthalmology and the advances it made in the recent war is yet to be written, after individual observations have been more generally coordinated, and more thoro study has been bestowed upon them.

In the reports of the above meetings to appear in this JOURNAL the attempt will be made to duplicate as little as possible, the reading matter put before our subscribers. A steadily increasing number of foreign subscribers must be informed of what is going on in Ophthalmology in the United States; but the bulk of our readers are American. The *Journal of the American Medical Association* reaches the great majority of them, and in it will be published most of the papers and discussions of the Section. These papers have already reached half our readers in the presession volume; and all of them will become available thru the transactions of the section, which will also contain a full report of the discussions to which they have given rise. Under these circumstances, except for the few papers that do not get published in the *A. M. A. Journal,* the account given in these pages will be little more than a resumé that will indicate what may be found in these fuller reports.

With the American Ophthalmological Society it is different. Its program with brief abstracts of most of the papers is sent to its members, less than 200 in number; and when its transactions containing those papers, and the discussions to which they gave rise, are published, they will have but a limited circulation outside its membership. Hence it is right that more of those papers should be published in full in this journal and elsewhere; and we will try to give a more complete account of both papers and discussions than is required for the meetings of the Section.

However much of value may be gained from reading reports of these meetings, let no one suppose such reading can be equivalent to attendance on the meetings themselves. Personal contact with one's colleagues, the subtle significance of tone and manner, cannot be transferred to the printed page; and much of the value of the meeting lies in those private talks between two or three friends where discussion is directed by individual interests and needs, where question and answer can follow each other so directly that the discussion is always kept to the point, and there can be no failure of interest.

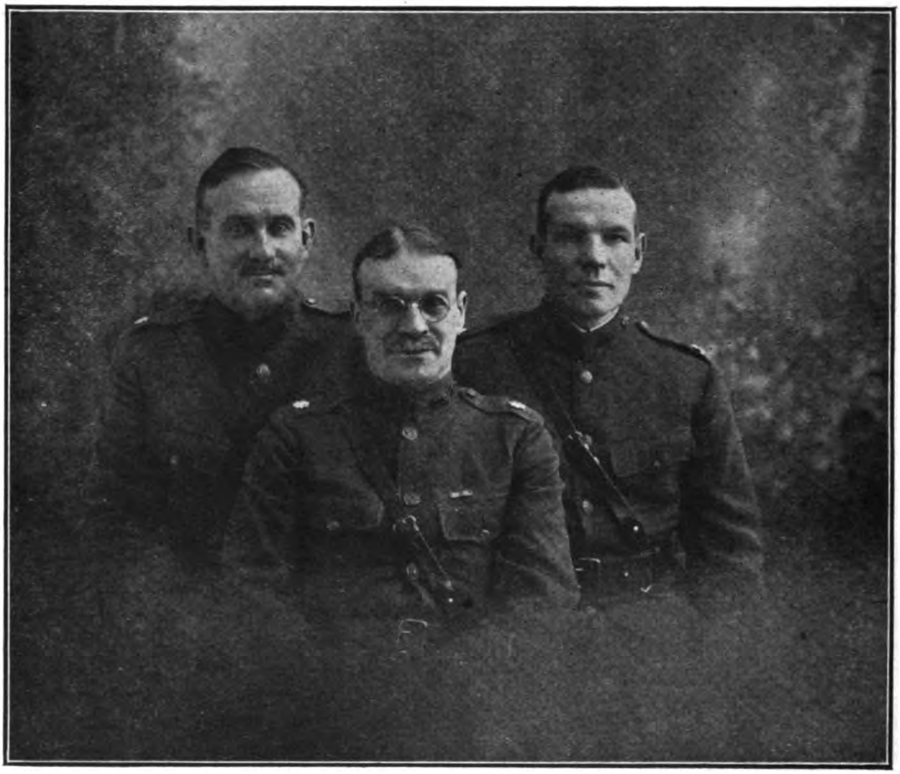
The efficiency of democracy is kept up by the continual infusion of new blood. Much of the success of these organizations depends on the wise choice of a new presiding officer each year, one who is familiar with the work of the society from long participation in it, and is particularly interested in making the meeting of his year a success.

The routine work of the organization is done by the Secretary, who when found efficient, is kept in office so long as he feels himself sufficiently compensated by the thanks and appreciation of his colleagues; and by a standing committee. In the Section of the A. M. A., the "Executive Committee" consists of the Chairmen of the three years immediately preceeding. In the American Ophthalmological Society, the "Council" is composed of five members, one chosen each year to replace the senior member, who retires from that body.

This year it was not surprising that the officers of the Section should be chosen from among those who had been the leaders of so large a portion of its members in military service. But it was an interesting coincidence that three of them had been so closely associated in their work in France, as the accompanying photographic reproduction shows. Dr. Allen Greenwood was chosen Chairman, Dr. Nelson Miles Black, Vice-chairman, and Dr. George S. Derby, Secretary of the Section.

Dr. Lee Masten Francis, who will represent the Section in the House of Delegates, was also closely associated with his colleagues in the work in France. Dr. Walter R. Parker, late chief of the Division of Surgery of the Head in the Surgeon General's Office, was chosen to represent the Section on the American Board for Ophthalmic Examinations. He succeeds Dr. Edward C. Ellett who by the completion of his second term on the Board became ineligible for reelection.

In the American Ophthalmological Society, custom determines the choice of the Vice-President of one year, to be the President of the next. In this way Dr. Hiram Woods of Baltimore becomes President of the Society and



Nelson Miles Black George S. Derby
Allen Greenwood

Dr. John E. Weeks of New York, Vice-President. Dr. Thomas B. Holloway of Philadelphia, having in the last year proven an efficient Secretary, is re-elected to that office.

Next year the American Medical Association will meet in New Orleans, probably early in May; and the American Ophthalmological Society will meet at Hot Springs, Va., in June. Those in charge of the preparations for these meetings are among our most valued collaborators and contributors. We tender them the hearty support of this journal in making their meetings most useful to the ophthalmologists of America. E. J.

WELCOME TO THE NEW EYE JOURNAL.

The Revista Cubana de Oftalmologia, under directorship of Dr. Francisco Maria Fernandez, of Havana, Cuba, with a large list of collaborators thruout the world, save in the enemy countries.

Surely this is the most pretentious first number of an eye journal that has appeared. It is a quarterly and to the reviewer's great pride, has been modeled upon the former American Quarterly, "Ophthalmology," now amalgamated with our journal.

The first number contains two hundred and twenty-six pages, of which sixteen are given to biographies of some of the editors of the original articles. Eight are by Juan Santos Fernandez upon various subjects. Of particular interest are those on cataract and trachoma. Uribe Troncoso has an article on acné-rosacea of the eye. Espino, Rinconos, Gonzales, Penichet, Cohen, Escolano, Francisco Fernandez and Guiral have the others.

A number of paragraphs are given to the progress of Ophthalmology, and more to extracts from the literature. Reviews of French, Spanish, American and Japanese journals are given.

Reports of the Section on Ophthalmology of the New York Academy of Medicine, the Ophthalmological Society of Madrid, and the Mexican Ophthalmological Society, together with necrologic notices and news items, make up a very commendable book.

The printing, paper and illustrations are beautifully done. Certainly Fernandez' ambition has led him to begin a great work, a man-sized job in fact, and a credit to the foreign language press.

H. V. W.

BOOK NOTICES.

The Blind, their condition and the work being done for them in the United States. By **Harry Best,** PhD., New York; The MacMillan Company. 1919. 763 Pages. Price $4.00.

After a life-time spent in the treatment of the eyes by the reviewer, it has always been a marvel to him that the practising oculist sees relatively so few of the blind. Our work being preventive of this terrible condition, it behooves us to have a little more knowledge of those who have passed beyond our help and this work is therefore a welcome source of information. The field of inquiry therein has been limited mostly to the United States, but takes up a vast number of subjects under the general headings of "The General Conditions of The Blind; Blindness and the Possibilities of its Prevention; Provision for the Education of Blind Children; Intellectual Provision for the Adult Blind; Material Provision for the Blind; Organizations Interested in the Blind; Conclusions with Respect to the Work for the Blind." Our particular interests are the questions of pensions, indemnities and legal measures. A great number of abstracts of legal cases are given, and are very valuable for reference. As experts, ophthalmologists are more or less often called into court, and questioned about these things.

H. V. W.

This book contains a wealth of material regarding blindness, as seen in its sociologic, institutional, economic and legislative aspects. If to it one adds the insight into personal problems and living adjustments, that are so well revealed in the little book of Javal, he will have a very good mastery of the subject in all its phases; as it is liable to be presented to the ophthalmologist by patients, corporations or courts seeking his advice and assistance.

E. J.

The Refraction of the Eye. A Manual for Students, by **Gustavus Hartridge,** F. R. C. S. London, Sixteenth Edition. 12 mo., 294 pages, with one hundred and ten illustrations. Philadelphia. P. Blakiston's Son and Co. 1919. Price, $2.25.

With regard to such a book, which has reached its 16th edition, the function of this notice is merely to introduce the work to a new set of readers, a new generation of students of ophthalmology.

As the subject of refraction becomes a fixed and definite part of the medical curriculum, we may expect a long life for the best text books relating to it. By comparison with others of its class this is found, after 35 years, still to be the best for the average physician taking up the study of ophthalmology as a specialty. It presents the basic facts briefly and clearly, with an abundance of illustrations, and practically no algebraic formulas to struggle with.

The plan of representing astigmatism by two lines at right angles to each other, and accompanying figures to give the diopters of ametropia in each meridian has been introduced to the profession thru this little work, and, is widely used to help understand and teach the subject.

Perhaps the most important additions we find are the account of new kinds of glass used in spectacles, and of the visual requirements for the Royal Air Force which has come into existence since the 15th edition was published. It is in striking contrast with the American standard, that the British admits fliers with vision of 6/12 in the best eye capable of correction to 6/6, and in the worse eye, 6/18 correctible to 6/12.

There are larger books on refraction, but none better than that of Donders which has been before the profession for 55 years. There are important things that are only to be learned from these larger works. But it would be a grave mistake for any one starting out to get a practical working knowledge of the subject to begin with the treatise of Donders, or others of similar size and detail. The best we can say of Hartridge's book is that it has all its old excellences and is kept well up to date.

E. J.

The American Encyclopedia and Dictionary of Ophthalmology. Edited by Col. Casey A. Wood, M. R. C., U. S. A., etc. Assisted by a large staff of collaborators. Fully illustrated. Vol. XIV. Chicago, Cleveland Press, 1919.

This volume carries the work from "Protractor" to "Retina, Cyst of the," making the number of pages thus far issued 11,208. The number of collaborators who have contributed to this work is 61, of whom 8 are already deceased. Judging by other encyclopedias and dictionaries there should be about three volumes still to come, and with the continued good health of the Editor and energy of the publisher these should be forthcoming by about the end of next year. We can begin to feel sure that it will be completed; and as such a tremendous undertaking is not likely to be attempted again in the near future, this work with possible supplementary volumes will long remain the great reference work on ophthalmology and related subjects.

In this volume, as in its predecessors, certain subjects, because of their scientific and practical importance and the space given them, stand out prominently. "Pupil in Health and Disease," written by Dr. Derrick T. Vail, occupies 245 pages, and constitutes the most complete monograph on its subject to be found in any language. But it differs from most monographs in adopting the encyclopedic, alphabetic arrangement of the topics treated. Thus "Diagnostic Value of the Pupil" is followed by "Dilated Abnormally," and "Epilepsy," "Eserin," and "Essential Mydriasis" follow each other in immediate succession. The number of such topics is several hundred, and there are many cross references within the section, so that it is really a better work for references than a more systematic monograph might be. To have stimulated the production of such an addition to ophthalmic literature is something in which Editor and Publisher might well take pride.

The other long section of this volume is the one on "Refraction and Accommodation of the Eye" by A. Edward Davis, 255 pages. Alphabetic arrangement is here impossible. So the section is broken into chapters, the headings of which are arranged in a sort of table of contents, placed at the beginning of the section; and prefixed to this is a list of cross references to 24 other sections of the Encyclopedia which bear on portions of the subject.

About half the section is devoted to "Introductory Principles and Methods of Human Refraction," and the remainder to "Clinical Applications of Refraction Methods." In the latter part illustrative cases are used very extensively. In the former we find, as familiarity with Dr. Davis previous writings would lead one to expect, an excellent, detailed account of the use of the ophthalmometer.

But it must not be supposed that these long sections include nearly all there is of interest and value in this volume. The section on "Radium in Eye Diseases," 10 pages, by the Editor, will be found fresh and of important interest to every one who is trying to keep up to date in ophthalmic practice. The same is true of such sections as those on "Retina, Angioid Streaks in the," "Angiomatosis,". "Angiosclerosis." "Pterygium," 23 pages, and "Ptosis," 47 pages, will measure up to standard. They also appear to be the work of the Editor, who has evidently taken a larger share in the compilation of the present volume than of most of its predecessors. With the return of men from military service the support of a wider circle of collaborators should be possible. The Encyclopedia is a live, going concern, and is worthy of editorial as well as of financial support.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C. Volunteers are needed in other localities.

DEATHS.

Charles Benson, of Dublin, died February 16, 1919.

A. A. Bradburne, formerly of Manchester, after lingering illness during which he resided in the south of England, died May 13th.

Walter Thomas Clegg, London, died in May, 1919.

Sir James MacKenzie Davidson, London, died at the age of 62. He was one of the foremost authorities in the world on X-rays, especially in their applicability to ophthalmology.

Louis Edouard Desjardins, of Montreal, died recently.

Edward F. Drake-Brochman, London, died early in May after a brief illness, aged 76.

James Hinshelwood, of Glasgow, died recently at Mentone, at the age of 60 years.

Lieut.-Col. Wm. Watson, C. M. G., F. R. S., died recently. He was one of the Professors of Physics at the Imperial College of Science, South Kensington. He was well known for his work on color vision.

COMING MEETINGS.

The Pacific Coast Oto-Ophthalmic Society will meet at San Francisco August 4-7.

The Colorado Ophthalmologic Congress will be held in Denver, August 4-5, and will include both ophthalmic and oto-laryngologic papers and discussions.

The American Academy of Ophthalmology and Oto-Laryngology will meet at Cleveland, Ohio, Oct. 16, 17, 18.

PERSONAL.

Dr. Alexander Brown announces the removal of his offices from the Medical Building to the Lathrop Building, San Francisco, California.

The residue of the estate of the late Dr. Richard A. Reeve, of Toronto, goes to the University of Toronto, but the amount is not definitely known.

Dr. Ryuzo Kodama, Associate Professor of Ophthalmology in the Tohoku Imperial University, Japan, is studying with Professor Ludwig Hekoten, of Chicago, Illinois; and attended the ophthalmological meetings at Atlantic City.

Dr. Francisco Maria Fernandez of Havana, Cuba, was a guest at the meetings of the Section on Ophthalmology of the American Medical Association and of the American Ophthalmological Society. He expects to remain in the United States thruout most of the summer.

According to the British Journal of Ophthalmology, C. B. Goulden, late of Oldham, has been appointed surgeon to the Royal London Ophthalmic Hospital. W. H. Brazil has been appointed ophthalmic surgeon to the Stratford-upon-Avon General Hospital. C. Killick, late of Maidstone, has been appointed surgeon to the Bradford Royal Eye and Ear Hospital. Alfred E. A. Loosely has been appointed assistant surgeon in the ophthalmic out-patient department at the London Temperance Hospital.

Col. Casey A. Wood, M. R. C., was recently surprised, deeply gratified and much touched by a letter from Mrs. John Couper, of London, England, in which he was informed that her husband (an old friend and teacher of Dr. Wood's) had bequeathed to the Doctor his own well-worn ophthalmoscope. This is the famous instrument which Mr. Couper used for so many years, and around which, for all the old-time students of Couper, there cluster so many very pleasant associations. The instrument is a "Couper ophthalmoscope" in even a secondary sense, being one of the long, slender ophthalmoscopes invented by Couper and supplied with the familiar endless chain of lenses subsequently adopted by Morton as the essential mechanism of his, perhaps, more widely known ophthalmoscope. The instrument will be mounted in a specially prepared case, and, so protected, will, together with the letter of Mrs. Couper and the biographic notice of her distinguished husband from the pen of Dr. Thomas Hall Shastid in this JOURNAL be presented to the Library of McGill University.

MILITARY NOTES.

Dr. George F. Suker, Chicago, has returned from military service to private practice.

Dr. Vard H. Hulen has returned to San Francisco after several months active duty in France.

Dr. Harry S. Gradle released from military service, has resumed practice at 22 E. Washington St., Chicago, Illinois.

Dr. Alexander D. McConachie, of Baltimore, announces that he has returned from France, and has resumed practice of ophthalmology and oto-laryngology.

Dr. H. W. Dudley has opened an office in San Francisco. Dr. Hans Barkan of San Francisco, will return to private practice on July first, after receiving his discharge from the army.

Lieut.-Col. Edward C. Ellett of Memphis, Tenn., who was commanding officer of Base Hospital Number 115, returned home about May 15th from his service overseas.

We are sure that all ophthalmologists who have returned from the service, have not been reported to us. Those who have been overlooked will confer a favor by so advising us.

Major Charles A. Bahn, M. C., Tulane University, New Orleans, formerly Adjutant Base Hospital 24, Ophthalmologist Base Hospital 24, and Consultant in Ophthalmology Limoges Hospital Center, is now visiting the eye clinics of Paris and assisting in the instruction of American officers studying there. Major Bahn is preparing an article on "Ophthalmological Paris" to be published shortly.

SOCIETIES.

Dr. Arthur J. Bedell, Albany, was appointed Chairman and Dr. I. W. Voorhees, New York City, Secretary of the Eye, Nose and Throat Section at the recent meeting of the New York State Medical Society.

Dr. Frank Allport, Chicago, was elected President and Dr. Chas. F. Burkhardt, Effingham, Secretary of the Eye, Ear, Nose and Throat Section of the Illinois State Medical Society.

The annual meeting of the Ophthalmological Society of Egypt met on Friday, March 7th, 1919, one day only, at Cairo. The paper on "Causes of Blindness in Egypt," read by Dr. A. F. MacCallen will appear in full in an early number of this JOURNAL.

MISCELLANEOUS.

"The National Committee for the Prevention of Blindness," Inc. leads the movement for the conservation of vision in the United States, publishes the facts about needless blindness and how to prevent it, plans campaigns of education and advises the workers, provides the literature with which to educate the people, promotes legislation for protecting helpless infancy from the great calamity of being made blind, and carries on relentless warfare on trachoma, wood alcohol poisoning, industrial accidents, harmful lighting conditions, and other causes of impairment of vision. This committee has members in every state in the Union, and in many foreign countries, and is glad to welcome everyone interested in this most necessary work of preventing needless blindness and deterioration of sight.

OPHTHALMIC LITERATURE

These lists contain the titles of all papers bearing on Ophthalmology received within the preceeding month. These titles are all in English, some of them modified to indicate more clearly their subjects. These subjects are grouped under appropriate heads, the succession of groups being the same from month to month. In the group the papers are arranged alphabetically usually by the name of the author in heavy-face type. After the subject of the paper (Ill.) indicates the number of illustrations. (Pl.) the number of plates, and (Col. pl.) colored plates illustrating the article. (Abst.) shows that it is an abstract of the original article. (Bibl.) tells that the paper is accompanied by an important bibliography. (Dis.) means that a discussion of the subject is published with it. Under Repeated Titles are indicated additional publication of papers already noticed. To secure the earliest possible notice writers may send copies of their papers, or reprints, to 318 Majestic Bldg., Denver, Colorado.

DIAGNOSIS.

Evans, J. N. Optotype for Young Children. Amer. Jour. Ophth., v. 2, p. 425.

McClean, W. Development of a Tonometer. Amer. Jour. Ophth., v. 2, p. 417-420.

Middleton, A. B. Congenital Eye Conditions Affecting Vision Out of Three Hundred Thousand Troops at Camp Travis, Texas. (1 col. pl., 6 ill.) Amer. Jour. Ophth., v. 2, p. 377-388.

Panni, N. P. Detection of Simulated Myopic Blindness. (1 ill. Charts.) Ann. d'Ocul., v. 156, p. 219-224.

Tuttle, E. R. Eye Symptoms an Aid to Diagnosis. Florida Med. Assn. Jour. April, 1919, p. 177.

THERAPEUTICS.

Darier, A. Ocular Therapeutics with Vaccines. Clin. Opht., v. 23, p. 195-204.

Hata. Instillation of Chinolin in Ocular Therapeutics. Nippon Gank. Zasshi, Sept., 1918.

Ito, F. Action of Atropin on Eyes of Japanese. Nippon Gank. Zasshi, Aug., 1918.

Nolf. Intravenous Injections of Peptone in Ocular Infections. Clin. Opht., v. 23, p. 217.

Titus, K. Pyreto Therapeutics in Ophthalmology. Clin. Opht., v. 23, p. 205.

OPERATIONS.

Finnoff, W. C. Reconstruction of the Eye. Colorado Medicine, v. 16, p. 155.

Rutherford, L. T. Lacrimal Gland in Surgical Anesthesia. Lancet, May, 1919, p. 792.

REFRACTION.

Andrews, M. P. Psychology of Refraction. Wisconsin Med. Jour., v. 17, p. 478.

Gardiner, E. J. Present Status of Refraction Work. Jour. Amer. Med. Assn., v. 72, pp. 1842-1827.

Pyle, W. L. Necessary but Often Neglected Refinements in Examination of Ocular Refraction. Jour. Amer. Med. Assn., v. 72, p. 1821-1824.

Suganuma, S. Pathologic Examination of Myopic Eyes. (7 ill. Bibl.) Nippon Gank. Zasshi, July, 1918.

Zimmermann, C. Fluctuations of Refraction in Developing Cataract. Amer. Jour. Ophth., v. 2, pp. 420-423.

OCULAR MOVEMENTS.

Argañaraz. Vestibular Nystagmus. (Bibl.) Arch. de Oft. Hisp.-Amer., v. 19, p. 169.

Bard, L. Mechanism of Nystagmus of Aural Origin. Ann. de Méd., v. 6, p. 1. Abst. Jour. Amer. Med. Assn., v. 72, p. 1874.

Benoit. Nystagmus Among Coal Miners. Le Scalpel, May 3, 1919.

Bourland. Paralysis of Superior Oblique in Diabetes. Ann. d'Ocul., v. 156, p. 225.

Santos Fernandez, J. Paralysis of Third Pair After Injury to Head. Rev. de Cubana de Oft., v. 1, p. 280.

Theobald, S. Correction of Muscular Anomalies of Eyes. (Dis.) Jour. Amer. Med. Assn., v. 72, pp. 1827-1831.

CONJUNCTIVA.

Archibald, R. G. Epithelial Xerosis of Conjunctiva in Natives of Sudan. Jour. Trop. Med. and Hygiene, London, v. 22, p. 81. Abst. Jour. Amer. Med. Assn., v. 72, p. 1793.

Dwight, C. G. Trachoma. Wisconsin Med. Jour., v. 17, p. 485.

Fernandez, F. M. Provoked Conjunctivitis. (Bibl.) Rev. Cubana de Oft., v. 1, pp. 343-347.

Gallemaerts. Congenital Bulbar Conjunctival Cyst. Ann. d'Ocul., v. 156, p. 218.

Hiwatari. Origin of Lymph Follicles. Nippon Gank. Zasshi, Sept., 1918.

Inouye, T. Trachoma of Limbus. (4 ill.) Nippon Gank. Zasshi, Aug., 1918.

Ishida, L. Lymph Glands in Episcleral Tissue. Nippon Gank. Zasshi, Dec., 1918.

Ishiwara, S. Roentgen Ray in Parinaud's Conjunctivitis. Nippon Gank. Zasshi, Sept., 1918.

Ito, F. Bacteriology in Eye Diseases. Nippon Gank. Zasshi, July, 1918.

McFarlane, D. Colloidal Manganese in Gonorrheal Ophthalmia. Brit. Med. Jour., April 5, 1919, p. 404.

Myake, F. Amyloid Degeneration of Conjunctiva. (1 col. pl.) Nippon Gank. Zasshi, Nov., 1918.

Pacheco Luna, R. Prophylaxis of Blennorrhagia Neonatorum. Rev. Cubana de Oft., v. 1, p. 292.

Trachoma in Guatemala. Rev. Cubana de Oft., v. 1, pp. 300-305.

Santos Fernandez, J. Spring Conjunctivitis in Cuba. Rev. Cubana de Oft., v. 1, p. 258. Conjunctivitis of Fornix. Rev. Cubana de Oft., v. 1, p. 251.

Saurl, R. Treatment of Pterygium. Rev. Cubana de Oft., v. 1, p. 337.

Wakisaka. Development of Trachoma. Nippon Gank. Zasshi, Sept., 1918.

Zankowich, L. Typhus Conjunctivitis. Deutsche med. Woch., 1916, p. 1443. Abst. Klin. M. f. Augnh., v. 57, p. 632.

CORNEA AND SCLERA.

Akazaki. Keratitis and Congenital Lues. (Bibl.) Nippon Gank. Zasshi, July, 1918.

Eperon. Correction of Keratoconus. Ann. d'Ocul., v. 156, p. 226.

Friedman, E. D. Unilateral Anesthesia of Cornea and Conjunctiva. Jour. Amer. Med. Assn., v. 72, p. 1812.

Fusihira, F. Neuroparalytic Keratitis. Nippon Gank. Zasshi, July, 1918.

Gallemaerts. Subconjunctival Lipodermoid of Cornea. (1 ill.) Ann. d'Ocul., v. 156, pp. 216-218.

Gonzalez. Episcleritis. Espana Oft., Mar., 1919, p. 133.

Hayashi, M. Prophylactic Treatment of Serpent Ulcer. Nippon Gank. Zasshi, Aug., 1918.

Kuboki. Anatomic Examination of Disciform Keratitis. (5 ill. Bibl.) Nippon Gank. Zasshi, July, 1918.

Masuda. Pathology of Diffuse Superfical Keratitis. (6 ill.) Nippon Gank. Zasshi, Oct., 1918.

Nishimura, K. Disciform Keratitis. (2 ill. Bibl.) Nippon Gank. Zasshi, Aug., 1918.

Pasetti, G. Provoked Conjunctivitis. Gior. d. Med. Mil. Roma, v. 66, p. 1086.

Spicer, W. T. H. Formation of Clear Lines in Nebulas. Proc. Roy. Soc. Med., London, 1918-19, Sec. on Ophth., pp. 1-3.

Wernicke, O. Bloody Infiltration of Cornea. Rev. Cubana de Oft., v. 1, p. 287.

Repeated Title. **Stähli** (v. 1, p. 749). Ann. d'Ocul., v. 156, p. 228.

ANTERIOR CHAMBER AND PUPIL.

Albright, G. A. Atropin, Cocain and Euphthalmin. Amer. Jour. Ophth., v. 2, p. 428.

Inequality of Pupils. Jour. Amer. Med. Assn., v. 72, p. 1867.

Ito. Aqueous Humor in Diabetic Rabbit. Nippon Gank. Zasshi, Dec., 1918.

Komoto. Persistent Pupillary Membrane. (4 ill.) Nippon Gank. Zasshi, Oct., 1918.

Menninger, K. A. Argyll-Robertson Pupils. Amer. Jour. Syphilis, v. 3, p. 232. Abst. Jour. Amer. Med. Assn., v. 72, p. 1790.

Nakamura, B. Instillation of Iodin and Ferro-cyanid of Potash into Anterior Chamber. Nippon Gank. Zasshi, Oct. and Dec., 1918.

Rasquin and Dujardin. Prognosis and the Argyll-Robertson Pupil. Archives Med. Belges, Jan., 1919.

UVEAL TRACT.

Harbridge, D. F. Interdependent Relationship of Uveal Tract Inflammations and Certain General or Focal Infections. Southwest. Med., v. 2, pp. 1-4.

Marco, B. B. Ocular Complications with Dental Infection. Amer. Med., v. 14, p. 286.

Tooke, F. T. Tuberculous Iridokeratitis—Some Features in Its Pathology. (7 ill.) Amer. Jour. Ophth., v. 2, pp. 395-407.

Urra, F. M. Studies on Regeneration of the Deep Membranes of the Eye. Murcia Med., v. 4, June, 1918.

SYMPATHETIC DISEASE.

Ichikawa. Causes of Sympathetic Ophthalmia. Nippon Gank. Zasshi, Sept., 1918.

Nakamura. Sympathetic Ophthalmia. Nippon Gank. Zasshi, Sept., 1918.

GLAUCOMA.

Meller. Late Infection Four Years After Elliot's Trephining. Cent. f. p. Augenh., 1917, p. 106. Abst. Zeit. f. Augenh., v. 38, p. 376.

Pava, C. M. Etiology of Glaucoma. Rev. Cubana de Oft., v. 1, p. 323.

Santos Fernandez, J. Glaucoma and Dacryocystitis. Rev. Cubana de Oft., v. 1, p. 264.

Van Duyse. Antiglaucomatous Trephining. Le Scalpel, v., 72, April.

CRYSTALLINE LENS.

Barraquer, I. Ideal Extraction of Cataract. Rev. Cubana de Oft., v. 1, p. 335.

Drouet and Plet. Cataract and Acidity. Progres Méd., v. 33, p. 443.

Fernandez, F. M. Indications for Operation in Unilateral Cataract. Amer. Jour. Ophth., v. 2, pp. 426-28.

Grahn, E. Differential Appearance of Lens During Embryonic Life. (7 ill.) Anat. Anzeig., v. 48, pp. 81-92. Abst. Zeit. f. Augenh., v. 35, p. 48.

Green, L. D., and A. S. Nonoperative Treatment of Senile Cataract. Amer. Jour. Ophth., v. 2, pp. 423-424.

Hallett, DeW. Cataract Extraction by Intracapsular Method. Hahnemann Mo., v. 54, p. 321.

McKellar, J. A. Absorption Without Needling of Cataractous Lens. Calif. State Jour. Med., v. 17, pp. 172-177.

Meller. Discission of Lamellar Cataract. Cent. f. p. Augenh., 1917, p. 111. Abst. Zeit. f. Augenh., v. 38, p. 376.

Pacheco Luna, R. Suture of Cornea in Cataract Extraction. Rev. Cubana de Oft., v. 1, p. 296.

Takanouchi, M. Cataract Extraction. Nippon Gank. Zasshi, Nov., 1918.

RETINA.

Bender, H. Lummer-Pringsheim Flicker Photometer. Zft. f. Psych. u. Phys. des Sinnesorg. ii. Abt. Zft. f. Sinnesphys., 1916, 50, 1-41. Abst., Klin. M. f. Augenh., v. 57, p. 629.

Birch-Hirschfeld, Detachment of Retina. Deut. med. Woch., v. 45, p. 148. Abst., Jour. Amer. Med. Assn., v. 72, p. 1647.

Coriat, I. H. Familial and Hereditary Features of Amaurotic Idiocy. Amer. Jour. Insanity, v. 75, pp. 121-132.

Fernandez, F. M. Ocular Symptoms in Toxemia of Pregnancy. Rev. Cubana de Oft., v. 1, pp. 347-352.

Nakamura. Congenital Hemeralopia. (Bibl.) Nippon Gank. Zasshi, Sept., 1918.

Nishioka, M. Retinitis Punctata Albescens. (1 col. pl., 2 ill.) Nippon Gank. Zasshi, Aug., 1918.

Oguchi, C. Etiology of Central Retinitis. Nippon Gank. Zasshi, Aug., 1918.

Ribon, V. Efficacy of Colored Glasses in Photophobia. (Bibl.) Rev. Cubana de Oft., v. 1, pp. 317-322.

Sauvage, R. Visual Illusions. Rev. Neurol., v. 25, p. 90.

Schlötz, I. Detachment of Retina During Pregnancy. Norsk Mag. f. Laegeviden., April, 1919, v. 80, p. 321. Abst., Jour. Amer. Med. Assn., v. 72, p. 1799.

Tigerstedt, R. Plethora of the Central Veins. Finska Läk-sällsk., Handl. Helsingfors, 1918, 60, 517-525.

Tomosi, A. Oguchi's Disease. Nippon Gank. Zasshi, July, 1918.

Uribe-Troncoso, M. Endovasculitis of Retinal Vessels of Tuberculous Origin. Rev. Cubana de Oft., v. 1, p. 285.

Waterman, A. H. Retinal Hemorrhage, Copremia. (Dis.) Jour. Amer. Inst. of Homeop., v. 11, pp. 1397-1403.

TOXIC AMBLYOPIAS.

Fusita. Central Scotoma in Beri-beri Amblyopia. (27 charts.) Nippon Gank. Zasshi, Oct., 1918.

OPTIC NERVE.

Frias Onate, A. Postgrippal Amblyopia. Rev. Cubana de Oft., v. 1, p. 330.

Mukai, H. Neuroretinitis After Salvarsan Injections. Nippon Gank. Zasshi, Dec., 1918.

Nakamura. Familial Leber's Disease. Nippon Gank. Zasshi, Sept., 1918.

Roemheld, L. Tabes Dorsalis or Meningitis Traumatica Following a Head Wound. Klin. M. f. Augenh., v. 57, p. 619.

Titschack, W. Eye Changes in Sinus Disease. Inaug. Diss. Kiel, 1916. Abst., Klin. M. f. Augenh., v. 57, p. 613.

Veasey, C. A. Unilateral Optic Neuritis. Amer. Jour. Ophth., v. 2, p. 429.

VISUAL TRACTS AND CENTERS.

Bates, W. H. Memory as an Aid to Vision. New York Med. Jour., v. 109, pp. 890-893.

Holmes, G., and Horrax, G. Disturbance of Spacial Orientation and Visual Attention with Loss of Stereoscopic Vision. Arch. of Neurol. and Psychiat., v. 1, pp. 385-408.

Santos Fernandez, J. Homonymous Hemianopsia of Trauma in Occipital Region. Rev., Cubana de Oft., v. 1, p. 283.

Wilson, J. A. Fields in Gunshot Injury to Head. Glasgow Med. Jour., v. 9, pp. 278-285.

COLOR VISION.

Ashikaya. Color Blindness. Nippon Gank. Zasshi, Nov., 1918.

Grill, C. Simultaneous Vision of Contrasting Colors with Abnormal Tri-Chromatic Vision. Upsala Läkaref. Fördhandl., v. 23, p. 367.

EYEBALL.

Frias Onate, A. Metastatic Panophthalmitis from Grippe. (2 ill.) Rev. Cubana de Oft., v. 1, p. 328.

Watanabe. Position of Ganglion Cells. Nippon Gank. Zasshi, Nov., 1918.

THE LACRIMAL APPARATUS.

Lichal, F. Anatomy and Histology of the Nasal Tear Duct of the Different Domestic Mammals. Anat. Anz., No. 11, 12, pp. 296-303 and 341-352. Abst. Zeitschr. f. Augenh., v. 35, p. 49.

Ogawa, S. Operative Treatment of Disease of Lacrimal Canal. Nippon Gank. Zasshi, Sept., 1918.

LIDS.

Beck, C. Plastic Operation for Restoration of Eyelids. Surg. Clin., Chicago, 1919, iii, 47. Abst., Intern. Abst. Surg., June, 1919, p. 461.

Briggs, H. H. Hereditary Congenital Ptosis with Report of 64 Cases Conforming to the Mendelian Rule of Dominance. Amer. Jour. Ophth., v. 2, pp. 408-416.

Campbell, J. A. Treatment of Warty Growths, Moles and Other Cutaneous Neoplasms on the Eyelids and Vicinity. (Dis.) Jour. Amer. Inst. of Homeop., v. 11, pp. 1412-1415.

Couce, F., and Poyales, F. Syphiloma of the Eyelids. Prog. de la Clin., v. 7, p. 92. Abst. Jour. Amer. Med. Assn., v. 72, p. 1878.

Halle. Plastic Surgery of the Upper Lid in the Radical Operation of the Frontal Sinus. Berl. klin. Wochenschr., 1918, 55, p. 892.

Ishida, L. Atypical Bell's Phenomenon. (8 ill.) Nippon Gank. Zasshi, Nov., 1918.

Komoto. Operation for Ectropion. (1 ill.) Nippon Gank. Zasshi. July, 1918.

Leriche, R. Treatment of Lagophthalmos. Presse Méd., v. 27, p. 205. Abst. Jour. Amer. Med. Assn., v. 72, p. 1646.

Van Duyse. Proboscis and Associated Anomalies of Face and Eye. Le Scalpel. April, 1917.

ORBIT.

Charlin, C. Orbito-cranial Syphilis. Ann. d'Ocul., v. 156, pp. 186-216.

Lagrange, F. Plastic Operation on Orbit. Jour. de Méd. de Bordeaux, v. 48, p. 369.

Vail, D. T. Orbital Abscess and Exophthalmos Due to Intranasal Suppurative Processes. Laryngoscope, v. 29, p. 263.

TUMORS.

Commes, C. Melanosarcoma of Choroid. Bull. Soc. Path. exot., Paris, 11, p. 36.

Dahms. Retrobulbar Tumors. Inaug. Diss. Berl., 1916. Abst. Klin. M. f. Augenh., v. 57, p. 617.

Fusita, T. Tumor of Lacrimal Gland. (1 ill.) Nippon Gank. Zasshi, Nov., 1918.

Komoto. Adenoma of the Meibomian Glands. (2 ill.) Nippon Gank. Zasshi, Sept., 1918.

Kuboki, H. Myxosarcoma of Orbit. (10 ill., Bibl.) Nippon Gank. Zasshi, Aug., 1918.

Kusama, K. X-ray Treatment of Retinal Glioma. (5 ill., Bibl.) Nippon Gank. Zasshi, Dec., 1918.

Rousseau. Hematoma of Optic Nerve. Arch. Méd. d'Angers, 22, p. 69.

INJURIES.

Boardman, W. W., and Donovan, M. M. Localization of Foreign Bodies in Eye. Calif. State Jour. Med., v. 17, p. 179.

Cantonnet. Chorio-retinal Lesions from Contusion. Paris Méd., 29, p. 64.

Gladhorn. Evulsion of Optic Nerve Following an Indirect Wound. Inaug. Diss. Berlin, 1916. Abst. Klin. M. f. Augenh., v. 57, p. 618.

Gomez, V. Injuries to Globe. (2 ill.) Rev. Cubana de Oft., v. 1, pp. 306-317.

Leo, G. Fractures of Orbit in War Injuries. Paris Chir., v. x, p. 97.

Löhning, B. Explosion Wound of the Eye. Diss. Heidelberg.

Nishimura. Ocular Injuries from Pyoktannin. Nippon Gank. Zasshi, Sept., 1918.

Pfister. Scleral Rupture, Aniridia, Luxation of Lens, and Increased Tension Following Wound. Inaug. Diss., Heidelberg, 1916, Zeitschr. f. Nervenheilk., 1916. Abst. Klin. M. f. Augnh., v. 57, p. 619.

Plitz. Magnet Extraction of Iron Splinters. Inaug. Diss., Breslau, 1916. Abst. Klin. M. f. Augenh., v. 57, p. 628.

Stark, L. Hysteric Self Injury to the Eye. Erlangen Diss.

Stumpf, P. Roentgen Localization of Foreign Bodies, Müller's Method. München. med. Woch., 1916, No. 45, Feldbeilage. Abst. Klin. M. f. Augenh., v. 57, p. 630.

PATHOLOGY.

Ewart, R. J. Influence of Age of Parent upon Development of Eye Color in Infant.—A Correction. Jour. Hygiene, v. 18, p. 95.

GENERAL DISEASES.

Allen, W. C. Epidemic Encephalitis. Southern Med. Jour., v. 12, pp. 231-234.

Comby, J. Lethargic Encephalitis. Arch. de Méd. des Enfants, v. 22, p. 259. Abst. Jour. Amer. Med. Assn., v. 72, p. 1875.

Early, R. O. Syphilis and Its Relation to Diseases of Eye. Jour. Oklahoma State Med. Assn., v. 12, p. 157.

Fernandez, F. M. Ocular Complications of Influenza. Rev. Cubana de Oft., v. 1, p. 341.

Gardini, A. Ocular Tuberculosis Treated with Tuberculin. Rev. Valli. de Especial, March, 1919, p. 70.

Greene, L. S. Acquired Syphilis of Eye. Amer. Jour. Syphilis, v. 3, p. 215.

Grenet. Lethargic Encephalitis. Presse Méd., Feb. 24, 1919. Abst. New York Med. Jour., v. 109, p. 957.

Mauldin, L. O. Eye, Ear, Nose and Throat in Influenza. Jour. So. Carolina Med. Assn., v. 15, p. 441.

Menacho. Ocular Complications in Grippe in 1918 in Barcelona. España Oft., March, 1919, p. 135. Arch. de Oft. Hisp. Amer., v. 19, p. 219.

O'Carroll, J. Encephalitis Lethargica. Dublin Jour. Med. Sc., May, 1919, p. 206.

O'Carroll, J., and Nesbit, G. Lethargic Encephalitis. Dublin Jour. of Med. Sc., v. 9, p. 206.

Ocular Sensibility to Pressure in Locomotor Ataxia. New York Med. Jour., v. 109, June 14, 1919, pp. 1034-5.

Sachs, B. Epidemic Central or Basilar Encephalitis. (2 ill.) New York Med. Jour., v. 109, pp. 894-899.

Schaller, W. T. Pathogenesis of Tabes Dorsalis. Arch. of Neurol. and Psychiat, v. 1, p. 749.

Takagi, S. Examination of Cerebro-Spinal Fluid in Different Eye Diseases. Nippon Gank. Zasshi, Oct. 1918.

Vest, W. E. Encephalitis Lethargica. West Va. Med. Jour., June, 1919, p. 454.

HYGIENE.

Code of Lighting for Factories, Mills and Other Work Places. Rep. from Pub. Health Reports, v. 34, Jan. 24, 1919, pp. 103-123.

Krückmann, E. and von Kern. Shooting Glasses. Berlin, 1914, A. Hirschwald, 315. Zeitschr. f. Augenh., v. 37, p. 247.

MacPhail, J. M. Eyes Right: Papers for Teachers and Parents on the Hygiene and Treatment of the Eye. Med. Jour. Australia. April 19, 1919, p. 329.

Jour. Australia, April 19, 1919, p. 329.

Sims, W. S. Conservation of Vision. Southern Med. Jour., 12, p. 273.

OPHTHALMIC SOCIOLOGY AND HISTORY.

Best, H. The Blind. Pp. 28-760.

Blind in Illinois. The Institution Quarterly, pp. 34 and 190.

Defective Training of Physicians in Ophthalmology. Jour. Amer. Med. Assn., v. 72, p. 1856.

Emerson, C. P. The Ophthalmologist and the Physician. Jour. Amer. Med. Assn., v. 72, pp. 1817-1821.

Fernandez, F. M. Ophthalmology in Cuba. Rev. Cubana de Oft., v. 1, p. 353.

Kershner, W. E. Clinical Observations in the Ophthalmic Service at Camp Sevier, S. C. Amer. Jour. Ophth., v. 2, pp. 389-394.

Loss of Use an Equivalent to Loss of Eye. (Medico-legal.) Jour. Amer. Med. Assn., v. 72, p. 1639.

Lundsgaard, K. Borri, Thomas Bartholin, Henrik Skriver. Janus, v. 23, p. 41.

Mellinger, C. University Eye Clinics and Ophthalmic Institutions. Helbing and Lichtenbahn. Zeitschr. f. Augenh., v. 36, p. 335.

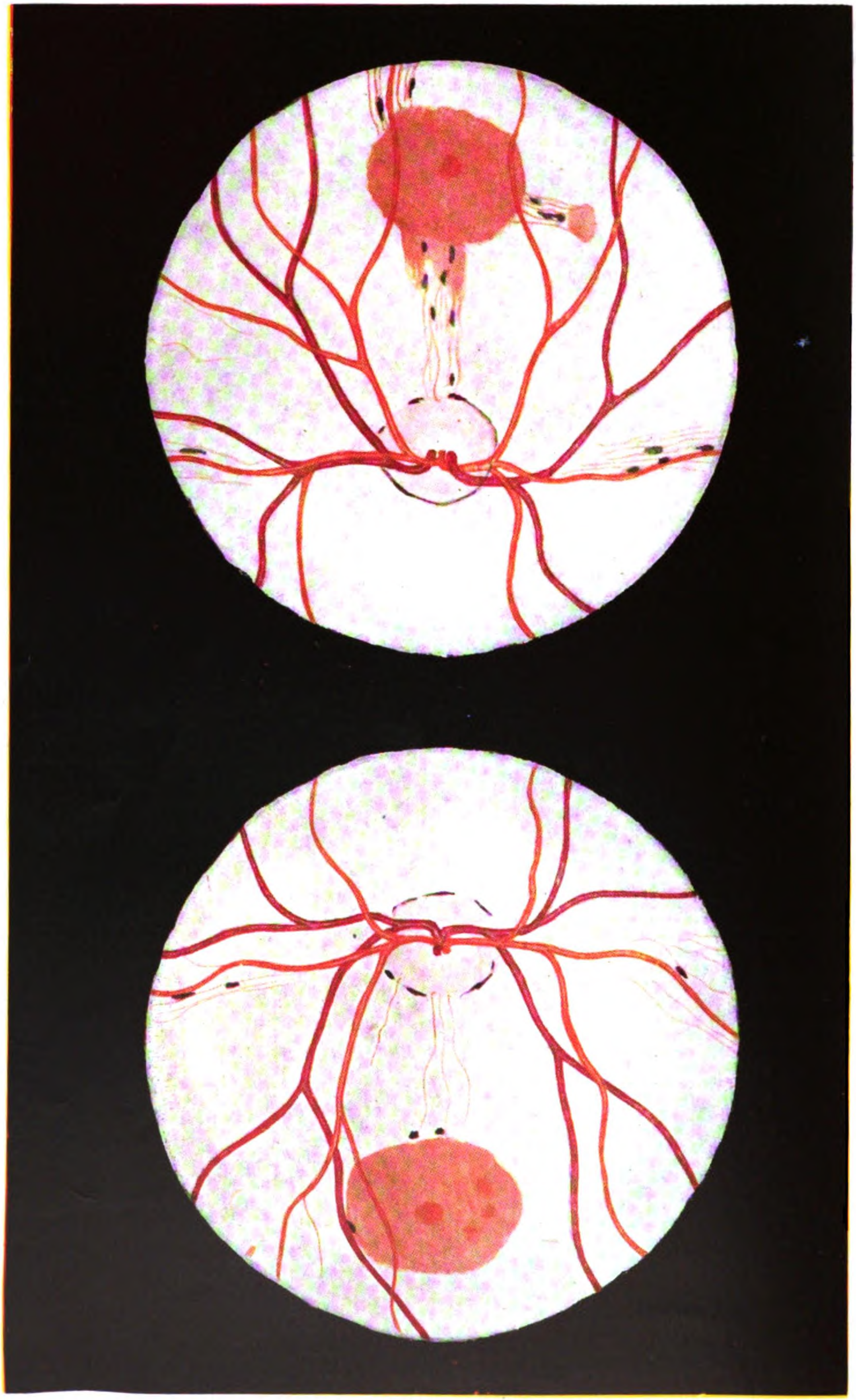
Rubio, J. F. Ophthalmology in Equador. Rev. Cubana de Oft., v. 1, p. 332.

Santos Fernandez, J. Ophthalmology and the War. Rev. Cubana de Oft., v. 1, p. 267.

Training in Ophthalmology. Brit. Med. Jour., April 5, 1919, p. 416.

Wilmer, W. H. Eye and Aviation. Arch. of Neurol. and Psychiat., v. 1, p. 162.

Würdemann, H. V. Post-graduate Medical School at Camp Lewis. Northwest Med., June, 1919, p. 112.



Choroideremia. Absence of Choroid over Entire Fundus Except Macular Region. (Connor's Case.)

AMERICAN JOURNAL OF OPHTHALMOLOGY

Vol. 2 AUGUST, 1919 No. 8

CONGENITAL CHOROIDEREMIA

A. B. Connor, M. D.

CHICAGO, ILLINOIS.

This case of absence of the entire choroid except in the macular area, observed by Captain Connor during his recent service in the Medical Corps in the United States Army, is of special interest because of the extremely small number of such cases hitherto reported. The circumstances under which this case was discovered indicate that they may be less rare than the reports seem to show.

On February 16th, 1918, Corp. C. B., Bat. B. 78 F. Art., came to the eye department of the Base Hospital at Camp Logan, Texas; complaining that he could not see to get about at night. Recently while on guard duty at night he had failed to recognize and salute an officer. As the bridge where the guards were stationed was over a deep drainage ditch, the soldier feared he would walk off some night and seriously injure himself.

Vision was tested with the regulation test type and found to be 20/20 in each eye. When told that his vision was normal, he replied, "Oh yes, I can see as well as anyone in the day time, but I cannot see as well as other people when it begins to get dark." This condition has existed as long as soldier could remember, eyes had never been sore and did not trouble him when he went to school. He had formed the habit at home of not going out much at night, unless some relative or friend went with him.

Patient twenty-five years old, a strong, well-developed soldier. Before entering the Army he did clerical work without trouble to his eyes. Personal history negative, not sick since childhood, thinks he had measles when six or seven years old, not very sick and does not think eyes were affected, denies venereal infection.

Parents both living and well, not related. One sister and one brother, living and well, none dead. No other case of night blindness in family that he knew of, and none have any form of eye trouble except one uncle on mother's side had repeated attacks of sore eyes. Says uncle had been ordered to wear glasses, but he does not think eyes were benefited by their use.

Examination shows lids and conjunctiva normal—pupils equal and respond to light and accommodation, iris normal and dark brown color.

Ophthalmoscopic examination shows cornea, lens and vitreous clear, but the picture presented by the fundus is most striking. Instead of the red fundus reflex usually seen, the examining eye encounters a glistening white fundus over which the larger retinal vessels appear about normal in size and distribution, (as shown in Plate XII). The sclerotic is exposed to view over the entire fundus, except a circular area about twice the size of the disc in the macular region. In this macular area the appearance of the fundus is normal, having the normal yellowish red color. The macula shows as a slightly darker spot in about the center of this patch of normal fundus. Scattered about the fundus are a few small ciliary vessels, and a few pigment spots. Both eyes are affected in the same way and present practically the same ophthalmoscopic picture, except that the left macular area is less regular in outline than the right, the latter having choroidal vessels extending out from it, toward the disc and below.

Altho the retinal vessels appear entirely normal the retina itself is not properly developed over the white area, as shown by the markedly contracted, field of vision (Fig. 1) which accounts for the symptom "night blindness," of which patient complains. The color fields are correspondingly contracted, the red and green having their normal relation. Both eyes are one-half diopter hypermetropic.

In looking up the literature on anomalies of the choroid, the writer was able to find only one allusion to this peculiar choroidal defect recorded—that by the English ophthalmologist, the late Nettleship. A copy of Nettleship's original article was not available, but in de Schweinitz' book "Diseases of the Eye," we find: "A striking developmental abnormality is one in which the entire choroid except a small area in the region of the macula is absent. To this condition the name choroideremia, has been given. Both eyes are affected. The patients are night blind." (Nettleship.)

From the brief description from Nettleship's paper it will be seen that the lesion and symptoms presented by other cases were identical with those of our soldier.

The question naturally arises as to whether this condition called choroideremia is in reality a condition separate and distinct from the more common defect of the choroid, coloboma. Is the former dependent upon different etiologic factors, or is it simply an unusual form of coloboma?

Fuchs, in discussing the cause of coloboma, attributes the defects in the choroid to nonunion of the edges of the retinal cleft.

Wm. Lang calls attention to the fact that a failure of the retinal cleft to close, would not account for those colobomata which are covered with retina. According to Lang the explanation of all congenital defects of the choroid, wherever situated, is the same, an adhesion forms between the developing retina and mesoblast, which latter consequently fails to become differentiated into choroid and sclerotic. If the adhesion occurs before the closure of the retinal cleft, the coloboma is devoid of retinal covering; if it occurs after the retinal cleft has closed the coloboma is covered with retina.

The retinal fissure begins to close at its posterior extremity, the closure extending forward along the under surface of the optic stalk and optic vesicle, until the cleft should be completely closed by the second month of fetal life. This development may be arrested at any stage, hence the shape

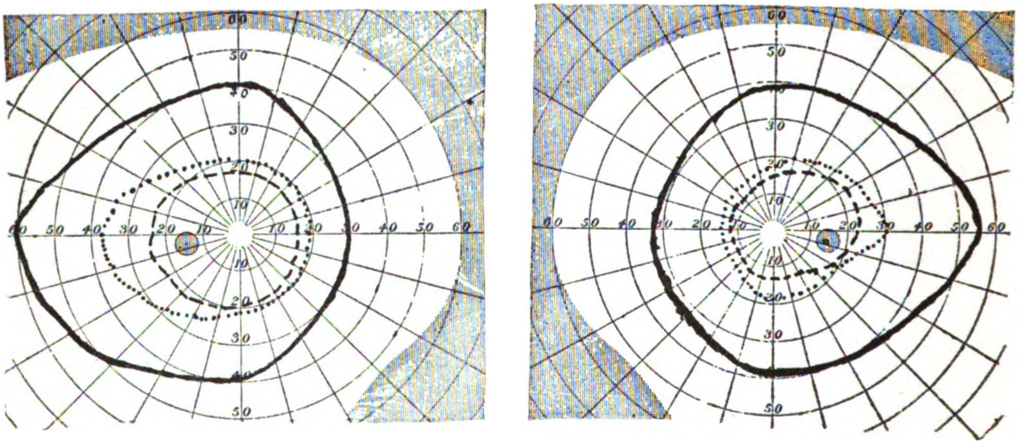


Fig. 1. Boundaries of Contracted Fields of Vision in a Case of Choroideremia (Connor).

of the typical coloboma is more or less triangular, situated in the lower segment of the fundus with the apex toward the optic disc, and broadening out as it extends forward toward the ciliary body. It may involve the ciliary body, iris and lens in this region, producing coloboma of these structures as an associated condition.

Whether or not colobomata of the choroid are due to adhesions between the blastodermic membranes as considered by Lang, it is certainly true that they usually occur along the line of the optic cleft and correspond to the general shape of this cleft during the various stages of its closure, so that we must consider their etiology as at least associated with the development and closure of this fissure.

The exception to this rule is found in those rare forms of coloboma which occur in areas of the fundus, remote from the region of the cleft, of which macular colobomata are examples.

In macular coloboma there is an absence of the choroid in the region of the macula, while in choroideremia, just the opposite is found, the macular area being the only part of the fundus which is supplied with choroid.

From the foregoing it will be seen that the lesion in choroideremia differs widely in location and extent from coloboma of the choroid; and it is not unreasonable to suppose that it has a different etiologic foundation.

The analog in embryonic life of what is later the macular area of the fundus is a spot on the outer surface of the secondary optic vesicle, where the first signs of differentiation of the mesoblast into sclera and choroid are seen, the first appearance of the choroid being manifest by a tiny plexus of capillaries at this point. Hence, in seeking an explanation of the cause of choroideremia, we must consider that differentiation of the mesoblast, of the secondary optic vesicles, into sclerotic and choroid, began in a normal way and at the normal point, but for some reason was arrested when only the macular area was supplied with choroid. [For references see p. 620.]

THE EYES OF THE SIGNALMAN

ALEXANDER DUANE, M. D.

NEW YORK CITY.

This paper, by a scientific investigator who has had practical experience as a signal officer, is especially valuable for its coordination of the scientific and practical aspects of the subject. It was read before the American Ophthalmological Society, June 14th, 1919.

These observations are based on a two years' experience in charge of the signal bridge on the U. S. S. Granite State. During this time I had the opportunity of testing practically the ability of some two hundred men in making and reading signals. A hundred of these served on the bridge under my direct supervision, so that I could judge, by actual observation of their work and of the behavior of their eyes under active service conditions.

The relation of ophthalmology to naval signalling may be studied under two aspects.

1. What are the visual qualities required in order to carry on the delicate and important work of signalling at sea?
2. What is the reaction of the eye to work of this sort, i. e. what pathologic effects may result from the visual strain involved?

The first question alone will be considered here, since with rather extensive opportunities for observation, I have had no occassion to note any untoward effects from naval signalling.

To answer either question intelligently, we must consider:

1. The character of the work to be done; i.e., the types and methods of signalling employed.
2. The conditions under which the work is done.
3. The consequent demands made on the separate functions of the visual apparatus and the nervous system.

TYPES AND METHODS OF SIGNALLING USED.

The main methods used in naval signalling to-day are:

1. Flag hoist.
2. The hand semaphore.
3. Flash light, blinker and search light.

Other methods, like the Ardois, the wigwag, the Very system, the machine semaphore, and signalling by shapes, are either disused altogether or are used so rarely as not to require any special consideration.

To the requirements involved in these forms of signalling must be added those demanded by other duties of men on the bridge, including their work as lookouts.

Flag Hoist. The flags used in the navy are the following:

1. International flags, 27 in number. Used both in international and navy signalling, but by entirely different codes, with both of which the signalman must be familiar. (I may point out that our men were also taught the English code, in which the same flags are used with still a different meaning).
2. Special navy signal flags, 16 in number.
3. Personal flags, from the president's flag, down to the commission pennant (captain's flag) and distinguishing flags of different branches of the service (coast guard, army transport, etc.). There are some 42 of these; or, including foreign ones, at least 60.
4. Ensigns and jacks of the United States and other nations. There are a great many of these, but 30 are commonly seen.
5. Call flags and call pennants, 46 in number.
6. Special English signal flags, numbering 35.

In other words, a man on the bridge has to be able to recognize and know the meaning of more than 200 different kinds of flags, of which 125 are in very frequent use.

The flags differ in shape and in color. In shape they are either square or oblong (called then collectively square flags, or simply flags); swallow-tailed (burgees); or triangular (pennants). The last are either very elongated, as in the commission pennant; moderately acute (twice or three times as long as broad); or equilateral, as in the senior officer's pennant. The colors found in flags are white, black, red, blue, yellow and green. The last is rare, being found in only one signal flag and in the ensigns of Italy, Portugal, Mexico, Bolivia and Brazil. Black occurs in three international and a few English signal flags and in the ensigns of Belgium, China and the central empires. The yellow used is a sort of sulphur color; the red is the hue of the stripes in the American ensign, or somewhat darker; the blue in American flags is the dark navy blue, in French flags a blue, lighter and therefore much more conspicuous.

The shape of a flag can be made out much further than can its color, and may by itself serve to distinguish the signal. Thus a burgee flying on an American man-of-war or merchant vessel must be either the international A or B, and, as the latter is a solid dark color (red) and the former a combination of light and dark (white and blue), it is easy to tell which flag it is, even if the actual hues in each cannot be distinguished. So too, it is always easy to make out the commission pennant, because no other flag has its whiplike shape.

If, however, a flag is fouled or is flapping a good deal, it may be hard to tell its shape, and then flags, otherwise alike, (international E and T, international G and K), may be mistaken for each other.

Another help in distinguishing the flag is its situation. Thus a flag flying at the flagstaff at the stern must be the ensign, and if it has another flag above it in the same hoist, the latter must be the church pennant; a dark flag flying in the bow must be a jack, while a dark flag at the main truck must be the personal flag of a rear admiral or superior dignitary (vice admiral, admiral, secretary of the navy, president); a dark pennant flying at the forward yardarm must be the meal pennant, while one flying at the after starboard yardarm along with a commission pennant at the truck must be the flag of the senior officer present.

But with all these helps the main thing after all by which we distinguish the flags from each other is their color. In this respect they leave much to be desired. This is partly due to the impossibility of making up different sufficiently distinctive color patterns for all the 200 or more flags used; but it is also due to poor choice of hues. The reds, brilliant at first, become too dark when the flags grow dingy (as they soon do); and in American flags, even when new, the blue is much too dark. Both colors, especially the blue, contrast but little with a mixed background (military mast, smoke-pipes, or land); and the blue at a little distance looks black and is often hard to make out at all. To see how the hue we use interferes with visibility, we have only to contrast American and French admiral's flags flying on neighboring ships. The light blue of the French is distinguished as a color twice as far as the dark blue of the American; and the flag itself is seen further as a flag, because contrasting better with the average background.

On the other hand, the yellows used are sometimes either too light or insufficiently saturated, so that against a sunlit sky they look white and are not very clearly distinguishable.

The poor coloration is particularly noticeable in our call pennants, which are used for calling individual ships to receive a message. These are made up of blue, red and yellow bands, arranged to denote letters by the dot and dash code (red representing a dot, yellow a dash, and blue repeating the color immediately preceding). The blue is too dark, the blue and red when in juxtaposition afford too little contract, and under some conditions the yellow is too light. If the blue were decidedly lighter, the red had more yellow in it, and the yellow were darker, the pennants would be much easier to read.

Flag signals are intended to be hoisted rapidly and read instantaneously. The ability to read them instantaneously is absolutely essential in battle signals and in all maneuvres; hence the men are drilled to vie with one another in making, reading and answering such signals with the greatest possible speed. And even in ordinary work it is highly important to be able to recognize the flags quickly at a distance. For example, when a warship comes into port, it flies its identifying flags or "call" (international, naval, or both) and usually another signal, which requires immediate answer, such as the four flag hoist meaning "May I anchor in berth assigned?" The signalman on the flagship must be quick to read all these flags, so as to identify the incomer and, in the few minutes before it can reach its berth, report it and hoist the "Permission granted" signal.

With rare exceptions, messages sent by flag hoist are code messages: i.e., each hoist denotes a word, phrase, or entire message.

Semaphore. In the hand semaphore (of which the machine semaphore, still used by the English, is a variant), an alphabetic or spelling code is used, the separate letters being indicated by the position of the arms extended at different angles. Thity different positions must be distinguished. Ordinary messages are sent at the rate of 18 to 20 words a minute, but a man has to be able to read at the rate of 25 words a minute, and the practiced hands can read 30 words a minute or more. We derive our semaphore from the English, who are past masters at it. The French also have a semaphore, differing from ours and, indeed, better in some respects, being more legible and easier to make out. In our work during the past two years, we had some occasion to be concerned with this, as we had frequently to do with French as well as with English vessels. [The Dutch have still another variety.] In the wigwag, whose use is also practically confined to sending spelling messages, each successive motion denotes, not an individual letter as in semaphore, but one of the dot and dash elements composing a letter according to the international Morse system. It consists simply in swinging a staff with a flag on the end either right, left or straight forward from the vertical position, a right swing denoting a dot, a left swing, a dash, and one to the front, an interval. As it takes, on an average, three motions to make a letter, and as the motions themselves cannot be made as fast as the changes of position in the semaphore, wigwag is about five times as slow as the latter. On the other hand, it is much more legible, since it is obviously a good deal easier simply to tell whether a motion is being made to the right or the left than it is to make out one of 30 possible positions made with the extended arms for only the fraction of a second. Hence the wigwag is used in landing parties or under other conditions when the distance is too great for semaphore and the searchlight cannot be employed. (A very effective, readily visible and readily legible form of wigwag is the torch and the hand lantern. These swung with the extended arm make an arc of light standing out clearly against the darkness. The movements, of course, are the same as with the flags.)

SEARCHLIGHT. This in the form either of the powerful searchlight. the flashlights on the yardarm (yardarm blinker), or the hand-held blinker tubes, is the regular method of signalling by night and is getting to be more and more used in the daytime also. The light is interrupted either by a make-and-break key in the circuit or by a shutter, and long and short flashes, corresponding to the dots and dashes of the continental Morse code, are thus made. The code and method are common to all nations, and we have repeatedly signalled by this means to French and Chilean, as well as to English and American ships.

This method has the great advantage over the others that signals sent by it can be read very much further and are not as much affected by weather conditions. It is, however, the most difficult of all methods, and proficiency in it is secured only by long and steady practice. It demands close concentration of sight and mind, and undivided attention. Practice during the first weeks is attended with visual and mental fatigue, so that the sight blurs and the mind wanders. With most persons this difficulty passes in time, altho men vary extremely in the rapidity with which they learn. Some few, mainly it would appear from lack of concentration, never get to be good searchlight readers, although they do well enough at the easier semaphore. In some of these cases it is possible that a refractive or muscular error had something to do with the disability, but my observations incline me to believe that it is due rather to mental inertness or nervous instability.

LOOKOUT DUTIES.

The man on the bridge is supposed to keep constant lookout. Altho the navy now divides quartermasters' duties, so that the ship's quartermaster does lookout work and the signal quartermaster confines himself to signals, yet in many cases the signal quartermaster has to attend to both. In any case he has to be capable of attending to both. He must then under all conditions of weather and visibility, make out, and make out at a distance, so as to report promptly, the rigs and distinguishing marks of all sorts of craft from a battleship to a motor launch, the insignia or flags that they carry, the various kinds of lights and shapes borne by ships to indicate what they are and what they are doing, and a great number of other things requiring mental alertness and quick and keen eyesight.

CONDITIONS WHICH AFFECT THE SEEING OF SIGNALS.

Even in good weather and with a clear atmosphere, signal work often makes high demands on a man's attention, his acuity and tenacity of vision, and his nerve control. A signal man must be able to keep his attention concentrated and his eyes glued on the sender, no matter what interruptions or distractions may occur, and particularly he must not lose his head if a word or symbol escapes him here and there. The tyro, no matter how well drilled, is apt to get excited when he is first put at doing real work on the bridge. If he misses a word, he goes to pieces and loses the whole message. Or his attention flags and he gets into a sort of daze, so that the symbols, especially the quickly alternating flashes of the searchlight, fail to make any impression on his mind. All this is due, of course, rather to lack of mental control than to real visual disability. Yet visual defects also play a part, either by making the signal so indistinct that it cannot be read at all or by making it so hard to see that the attention is strained to the utmost and gives out even sooner than it ordinarily would.

Quite the same is true of attendant conditions that make the perception of signals difficult. The conditions, then, that affect the perception of signals may be divided into, first, those that concern the visibility of the signals themselves; second, those that concern the visual ability of the receiver.

CONDITIONS AFFECTING THE VISIBILITY OF SIGNALS.

1. Distance.—The maximum distance at which signals can be seen varies greatly with the method used, with the conditions under which the signal is seen (illumination, state of atmosphere, background), and with the experience and visual ability of the receiver. The maximum distance at which a man with good sight and working under favorable conditions can read signals with the naked eye for semaphore is one-third to one-half mile; wig-wag, one to two miles (depending on size of flag used); wig-wag torch, two to four miles or more; flag hoist (for flags of battle-ship size), half a mile (more for some flags); blinker light, three or four miles; searchlight, practically any distance.*

For flag hoists, wig-wag, and semaphore, these distances may be doubled or even tripled by the use of binoculars or telescopes, provided the weather and other conditions are such as to render these aids available. Binoculars do not in general help in distinguishing blinker or searchlight, except occasionally in the daytime when they are drowned out by excess of light.

Distance affects not only the definite form, but the distinction of color—blues tending to look darker and ultimately black, and yellow lighter and ultimately white.

The attempt to read signals at maximum distance requires, of course, strict attention, and, if maintained for any time, may strain the visual power to the point where it gives out.

Illumination and Background.—For semaphore, wig-wag, and flag hoist, bright daylight with the sun shining on the object and a clear, all-round sky background make the ideal conditions. Seldom are these attainable. The light is often poor. When it diminishes greatly, both form and color perception are affected. In dusk, for example, the semaphore letters may not be distinguished more than two or three hundred yards at best, and both form and color of flags become illegible. Theoretically, as the light diminishes, the red should appear darker and the blue lighter, so that one might suppose that the color value contrasts would enable us still to distinguish the flags. This is not the case. The blue and red of our signal flags are such that with diminishing light both tend to look black. Another ill effect of reduced illumination is that for long distances binoculars no longer aid the vision. In fact, one sees better without them.

---

*Theoretically, flag signals should be seen twice as far as this, and semaphore half as far again. But, owing to the fact that under the best of working conditions the semaphore background is not ideal, and that flags are never blown out perfectly straight nor against a properly contrasting background, the distances are about as stated.

I may add that very erroneous statements are made in this regard, especially by men in the service. Misled by them, I made some gross exaggerations in my article on Sight and Signalling in the Navy, read before the American Philosophical Society.

On the other hand, the light may be too bright. The sun shining behind a man semaphoring or a flag hoist or a searchlight drowns out the signal and, in the case of a flag hoist, makes the shape uncertain and the color indistinguishable. It may also so dazzle the receiver that he cannot keep up the effort of reading the signals. The same is true of the very bright searchlights now used, if the observer is too close to them.

A complete sky background is rarely secured. In semaphore and in wigwag this factor counts immensely. Semaphore hand flags held below the waist line, as in making the letters A, G, H, I, L, X, and Z, are nearly always backed by some object on the bridge and very often in all positions are obscured by masts or smoke pipes, so that they hardly show at all. The same is true of flag hoists when, as often happens, they are backed by a cage mast, by the shore, or by smoke.

Under the service conditions ordinarily prevailing, the illumination and background, particularly the latter, are more important for the legibility of a signal than is the distance at which the signal is situated. This fact has a special bearing on the visual qualifications that we should demand of the signalman himself. The best signalman, in fact, is not necessarily he who can see the farthest, but he who can discriminate most readily slight differences in contrast between signal and background.

3. Atmospheric Conditions.—Haze, rain, or snow obviously make signals of all kinds indistinct in proportion to the intensity of the obscuration that they cause; and, moreover, as in the case of diminishing illumination, give trouble because even a moderate obscuration due to these factors renders binoculars useless.

4. Wind.—Unless a ship is under way, a certain amount of wind is needed in order to blow out the flags in a hoist and make them distinguishable. Many of the flags, to be sure, and especially the call-flags and most of the international flags are so patterned as to be distinguished if even only a small portion shows, and men get quite adept in recognizing them when hanging limp. The call pennants, on the other hand, must as a rule be seen in their entirety to be recognized, so that they need some wind to blow them out. A wind blowing straight toward or away from the observer is as bad as no wind at all, and a very gusty wind, which makes the flags flap or foul, is also an obstacle to clear reading. It also interferes greatly with the use of a binocular or telescope, both being hard to hold steady in a strong wind, and the object swaying as the glass does, only three or four times as much.

Incidentally, a sharp wind blowing right into a signalman's face may suffuse his eyes with moisture and thus blur the signals at a critical moment.

5. Motion of the Ship.—This interferes very considerably both with sending (especially with the semaphore), and with receiving. It is particularly troublesome when binoculars are used, as the latter, of course, magnify every movement.

6. Faulty Technic.—This is one of the most prolific causes of difficulty in making out signals. The careless sender in semaphore chooses a bad background and makes his angles badly, so that his letters cannot be distinguished; and with the searchlight runs his dots together, uses a faulty rhythm, or omits spaces between words. These are a few of the defects known and reprobated on the bridge. They diminish legibility to a very marked degree and, to that extent, impose additional visual strain on the observer.

7. Use of Binoculars and Telescopes.—A glass is indispensable on the bridge for reading semaphore beyond a third of a mile or flag hoists beyond half a mile. The ordinary glasses double or triple the distance at which signals can be read. On some of the ships powerful telescopes are mounted, with which flag hoists and semaphore can be seen much further. But glasses, and especially telescopes, are hard to use if either the sending

or the receiving ship is rolling, or if there is a high wind, or the weather is wet. A mounted telescope naturally is applicable only when the ship is fairly still. In a mist or at dusk, as before remarked, objects cannot be seen any better with a glass than with the naked eye—usually not as well.

Generally speaking, any condition that interferes with the use of a glass is troublesome in proportion to the power of the latter—a fact which limits the use of glasses under service conditions to comparatively low powers.

CONDITIONS AFFECTING THE SIGNALMAN HIMSELF.

From the above description it is evident that the signalman has to make out instantly and with precision a great variety of objects and a number of variants of the same object, differing either in form or in both form and color, and has also to distinguish light flashes, varying in length and sequence and recurring with great rapidity, and that he must do these things under the most varying conditions of light, shade, background, and weather. Add to this the fact that his work is often carried on under conditions of high tension, hurry, and great responsibility, and we see that the service makes great demands on the visual acuity, the color sense, the light sense and adaptation, muscular coordination, nervous energy, and physical endurance. The relative importance of each of these factors will now be considered.

1. VISUAL ACUITY.—Considering the work that a signalman has to do in the recognition of distant objects, the Navy requirements of 20/20 vision for each eye without glasses, seem none too severe. If in selected cases glasses are allowed—and I should be in favor of allowing them in such cases—the vision with them ought not to be less than 20/20, each, and it might be well to require 20/15 in at least one eye.

Only in very exceptional cases should a man be allowed to serve on the bridge, whose vision without glasses is less than 20/30 in his better eye and less than 20/40 in his poorer eye.

Nevertheless, I am persuaded that visual acuity, per se, at least as we test it with our charts, is not the most important of the visual factors. For it does not by itself measure the ability to recognize far distant objects when seen under the conditions that prevail on shipboard. More important in this regard is the light sense. To this point we will recur presently.

2. REFRACTION AND THE USE OF GLASSES.—No signalman should have any very high degree of ametropia. Myopes of any considerable degree are, naturally, excluded. Hyperopes also may have to be excluded if their error is so high as to make us fear that the accommodation cannot always and readily correct it. In judging this we must remember that on the bridge the accommodation may be weakened by continuous nervous strain or by prolonged deprivation of rest and sleep. Under these conditions even a slight hyperopia may become an excessive burden and then either the vision blurs or the attention flags. Whether this is likely to happen or not depends largely on the signalman's physique and nervous stability, but unless these are exceptional he should not, I believe, have over 1 D. or, at most, 1.5 D. of uncorrected hyperopia. Probably about the same statement can be made with regard to astigmatism.

It is difficult to form a judgment on these matters, because refractive errors are not much in evidence on the bridge. Of the 101 men who from time to time served on the bridge of the Granite State, only 6 (5 besides myself) wore glasses. The remaining 95, having passed the Navy examination, had presumably 20/20 vision in each eye without correction. Of the men wearing glasses, two had two or three diopters of mixed astigmatism, but in the case of one, at least, this seemed to cause no trouble, as he was one of the best receivers on the bridge. The other (myself) had sometimes considerable difficulty in reading signals, but this was apparently due only in a very subordinate degree to the refractive error. Two of the other men had a moderate degree of hyperopic astigmatism. In one the refractive error seemed not to interfere with his work either before or after he put on glasses. In the other, who had anisometropia besides, the refractive error may have had some effect in reducing his efficiency, especially in reading searchlight, but his difficulty may with more plausibility be ascribed to his very nervous temperament, which made him give way readily under strain. In the remaining three, one of whom was quite myopic, the refractive error had no apparent effect on their signalling ability, which was all that could be desired.

So far as such a small number of cases can prove anything, they would seem to indicate that refractive errors in themselves are no essential impediment to signal work. They would also indicate that the wearing of glasses is not incompatible with efficiency in this regard. Indeed, one would naturally suppose this to be the case, since signalmen on the bridge constantly use binoculars or telescopes, which are apparently liable to just the same objections as the spectacles that a man wears. Nevertheless, it cannot be denied that under such conditions as prevail on the bridge spectacles are a real inconvenience. They produce disturbing reflections. They readily become dimmed with moisture or marked with grease, and even when clean apparently cut off enough light to render the recognition of faint distant objects more difficult. Nor is the improvement produced by glasses in distant vision at all comparable with that obtained with the same glasses when looking at an object at twenty feet. This is a fact that our patients often insist on, and I think we should give it more heed than we are apt to do. In my own case, my vision with glasses is 20/20 and without them is about 20/40. Yet under nearly all conditions of distant vision, I can make out far away flags, semaphore signals, etc., almost, if not quite as well, without my glasses as with them.

My own judgment on this matter is that, always making exception of the specially qualified men, no one should have a place on the bridge who cannot see distant objects (but not, of course, the ordinary test-card), as well without glasses as with them. If he can do this and has by the test-card 20/20 with his glasses and at least 20/40 without, he may be placed on the bridge, and may then either use his glasses or not, as he wishes, altho he should be encouraged to do his signalling with them.

3. Color Sense.—On the great importance of a keen color sense, there can be no difference of opinion. So many of the flags require for their recognition quick and accurate color discriminations (between shades, often, of about the same light values), that a man who is deficient in this regard would be unserviceable for signalling. Equally important is the ability to distinguish colored lights, particularly the green starboard and red port light of a vessel under way, and the combinations of red lights which distinguish pilot vessels, fishing vessels, cable ships, and various other vessels of special character.

4. Light Sense and Adaptation.—Acute light sense and ready adaptation are essential qualifications of a signalman. It is indispensable that he should be able to distinguish readily a dark object against another nearly as dark, should make out colors, movements, and shapes against a background which affords but little contrast, and should see well in rapidly fading twilight and in murky weather. It is also important that he should be able to stand the glare of the sun, shining on the water, or behind the signal, or the powerful searchlight, without getting dazzled or fatigued.

Bridge work and especially the reading of searchlight signals, in which bright light flashes of light alternate with darkness, require quick adaptation and a mobile pupil.

Compared with a good light sense, visual acuity is of subordinate importance, and for that reason our visual tests, as ordinarily conducted, do not give the best idea of the availability of a candidate for bridge work. If we have no photometer with which the light sense can be measured accurately, the latter may be determined by tests made under actual service conditions, i. e., by making the candidate pick up distant objects and describe their form and color, when viewing them under varying and especially under unfavorable conditions of illumination and background.

5. MOTOR ANOMALIES OF THE EYE.—I should say that these affect a signalman's efficiency to only a very subordinate degree. As vision is concerned altogether with distant objects, errors of convergence and accommodation cause no particular trouble. A man who has a tendency to diplopia at a distance in distant vision (e. g. from weak externi or from hyperphoria), may be confused especially in taking searchlight signals, and, of course, eyes so affected tend to give out sooner than do those that can easily maintain binocular fixation and binocular vision.

6. REACTION TIME.—Nowhere, except in the turret or at the wheel is the slowly reacting man more out of place than on the bridge. On the bridge a man must be constantly on the alert for visual impressions of all kinds and coming from all quarters, must take them in instantaneously, realize their significance, and act on them without a second's delay. This means that he must be quick to react properly to any stimulus, whether signal, order, or question.

7. MENTAL AND NERVOUS STABILITY.—The ideal bridge man is one who is neither stolid nor erratic, but one in whom quickness of body and mind and a superabundant energy are combined with steadiness under all conditions, an even temper, and a happy disposition. He is one that is quick and eager to learn, enthusiastic, in love with signalling, industrious, always amenable to discipline, yet always also capable of independent thought and action, and, above all, he is reliable.

A man who has these characteristics I would pick out for the bridge, even if he had some apparently prohibitive visual defects and refractive errors. He would, as I know, make good in spite of them. And a man of opposite characteristics I would not have, no matter what his vision. It requires a special disposition and aptitude of mind to be a signalman, and it is not worth while to try to train those who are either indifferent or unmanageable. The work is too important to be put into such hands.

CONCLUSIONS.—My observations have led me to the following conclusions:

1. The visibility and legibility of our signal and other flags could be much improved if the blues were made much lighter, the reds were made somewhat lighter, and care was always taken not to make the yellows too light.

It would also be better if the pennants had a rounded or obtuse, instead of a finely tapering tip, as this part of the flag becomes hard to read in proportion as it tapers down.

2. The ocular requirements that we should lay down for a candidate for signal work should always be considered in connection with his other physical and mental qualifications and to a certain extent should vary with these.

A like correlation between the strictly physical qualifications and the general mental and moral make-up of the candidate should, I believe, be made in the case of all candidates for military and civil positions. This is done now to some extent, but the principle might be extended with advantage. As I have elsewhere remarked, this correlation is best affected if the medical officer who makes the physical tests and the professional expert, who gauges the probable availability of the candidate from a technical standpoint, work hand in hand.

3. In making such a correlation, we must distinguish between the visual requirements, which, being indispensable for the purpose in hand are necessarily inflexible, and those in which more latitude may be allowed.

4. For signalling the ideal visual requirements are: Visual acuity of 20/20 in each eye without correction; perfect color sense; first-rate light sense and quick adaptation; orthophoria for distance and near, with good converging and especially with good diverging power; quick reaction time.

5. Of these requirements three are indispensable, viz., perfect color sense, first-rate light sense, and quick reaction time. Coupled with these there must be a good all round physical condition.

6. To test these matters out in a practical way, I would first take each applicant's vision; examine his color sense with the lantern and with other tests, of which, I think, the most available are Nagel's and Stilling's; if a photometer could be had, I should measure his light sense with it, and, if I had no photometer, would test out the light sense by making the applicant pick up faint distant objects under difficult visual condition; I would apply some simple psychologic tests to ascertain his reaction time and quickness in making mental discriminations; and would determine his muscle balance for distance and near and his converging and diverging power.

Those who showed deficiency in color sense or light sense, were markedly slow in their reactions, or were evidently below par in their physical and mental vigor, I would reject at once. The rest I would place in a signal class, conducted at first below decks, later on the upper deck and on the bridge.

7. Of the men so placed, I would put those with subnormal vision or abnormal motility in a probationary class. While they were in this I would ascertain the cause of their deficient sight, and if it was due to a refractive error would correct it.

8. Those of the signal class who displayed marked enthusiasm and readiness in learning, and steadiness and reliability in their work coupled with the ability to discern far distant signals or objects under all sorts of service conditions (especially when the contrasts were poor), I would admit to permanent service on the bridge even if their visual acuity was not up to the full standard. I should even think it proper in the case of specially good men to take them on even if their ametropia was such that uncorrected vision was 20/40 or less, so that they could not see distant objects by any means as well without their glasses as with them. Such men, of course, would have to do their work on the bridge with glasses, which, after all, are only a relative handicap.

On the other hand, no matter how perfect his vision was and no matter how technically well-fitted he seemed, I would not have a man on the bridge who showed in the preliminary work in the signal class that he was erratic or quarrelsome, or who did his duties carelessly, perfunctorily, or reluctantly, or who was unreliable.

In fine, my idea is that the initial physical examination should be more or less elastic and tentative, eliminating simply those who are absolutely unfit, but admitting to further trial under service conditions all the other applicants, whether visually below standard or not; and that when this further trial has disclosed what each man's visual, mental, and moral qualifications are, the signal officer with, if necessary, the aid of the surgeon shall determine which of the men under investigation are fit for duty on the bridge.

THE ORGANIZATION AND ACTIVITIES OF THE OPHTHALMIC SERVICE IN THE AMERICAN EXPEDITIONARY FORCES

ALLEN GREENWOOD, M. D.

BOSTON

This may be regarded as an authoritative history of the ophthalmic service in the American Expeditionary Forces, as complete as can be offered at the present time. It was presented before the Section on Ophthalmology of the American Medical Association, June 11th, 1919.

Early in May, 1918, a senior consultant in ophthalmology was obtained for the A. E. F., and the following is a brief summary of the organization of the ophthalmic service in the A. E. F. and a partial record of its accomplishments. As a result of the work and observations of the senior consultant and his assistants, suggestions for the future are incorporated in this report.

The whole can best be presented under several headings:

1. PERSONNEL AND EQUIPMENT

A review of conditions found in those hospitals of the A. E. F. which were visited by the senior consultant in May and June will give the best idea of conditions pertaining to the late spring and early summer:

1. *Base Hospital* 15, *Chaumont.*—Lieut. (now Capt.) G. H. Grout was in charge of a small eye clinic, which was combined with that of the ear, nose and throat. His equipment was very meager, there being no magnet, no army eye case and no auxiliary case, while the space at the disposal of the eye department was totally inadequate for the purpose. After conference with Lieutenant Grout and the commanding officer, a room was selected for the occupancy of the optical unit; and the east end of the lower half of the Baudens Pavilion was selected for an eye ward, reserving the three end rooms for the clinic and operating rooms. Later, two magnets were secured for this clinic and full instrumental equipment, thus making a very efficient eye center, which was kept constantly busy during the rest of the summer and fall. After the work had increased, an assistant was assigned to Captain Grout. The suggestion was made to Captain Grout and the commanding officer that a nurse who had had some training in eye work should be assigned to Captain Grout's clinic as the permanent nurse in charge. This same suggestion was made in all of the base hospitals where it was thought practicable in order that soldiers with diseased and injured eyes could have *experienced* nursing service at all times. It has been found that a rotation of nurses in the eye service is detrimental.

2. *Base Hospital* 18, *Bazoilles.*—Lieut, (now Capt.) Lloyd B. Whitman was in charge of the eye work. He had a small clinic and his patients were scattered. His equipment was found to be very meager and steps were immediately taken to bring about improvements in view of the projected development of a large center at Bazoilles. A large and small Lancaster magnet were secured and a full instrumental equipment. A section of a ward was assigned for the eye cases and rooms set apart for an eye clinic and one for an optical unit. Later in the season, one of our most efficient eye centers was organized at Bazoilles under the charge of Captain Whitham, but owing to the lack of available space at Base Hospital 18, one of the newly erected buildings at Base Hospital 46 was selected to be rearranged according to plans furnished by the senior consultant. These plans were sent to the office of the chief surgeon for approval and also sent to the other growing hospital centers, similar to Bazoilles.

This center performed most efficient service thruout the trying period of the fall offensive. Several of the ophthalmic surgeons in the surrounding hospitals came to the center to assist Captain Whitham with the work. Capt. H. B. Chandler, of Base Hospital 116, was especially helpful. The optical unit was also transferred to Base Hospital 46 and from this base supplied the Toul area and

Base Hospital 66, as well as the Bazoilles area. It established itself as one of the most active and efficient of our optical units. A number of special operations were performed at this center by the senior consultant in ophthalmology and by the assistant consultant.

3. *Base Hospital* 36, *Vittel.*—The eye clinic here was in charge of Capt. W. B. Haughey, who had the best and most complete equipment for ophthalmic surgery of any of the then active American hospitals in France. This equipment was brought with Base Hospital 36 and *illustrates the great advantage of having each base hospital transport its own special equipment.* Two Lancaster magnets were found installed and a room devoted to the use of the eye clinic. Base Hospital 23, which was in close proximity to Base Hospital 36, also had an eye clinic, but without adequate equipment for ophthalmic surgery. An optical unit was, however, first assigned to Base Hospital 23, in a room provided for it, as most of the refraction work was being done here. Later Maj. J. M. Patton was assigned to Base Hospital 36 to take charge of the eye work and organize an eye center for the Vittel and Contrexeville area. Several rooms at Base Hospital 36 were assigned to him in which to locate a central eye clinic, as all such work, including refraction, was now to be carried on here, and a room was also set aside for the optical unit transferred from Base Hospital 23. Major Patton was made consultant for the combined Vittel and Contrexeville areas and most of the serious operative work was routed or transferred to his clinic. This plan of centralizing the eye work for the area under the consultant at Base Hospital 36 worked out most admirably, and a great deal of praise is due Major Patton for the efficient manner in which he built up this center, which, with the special wards placed at his disposal, soon became one of the most active ophthalmic centers in the advanced area.

4. *Base Hospitals* 31 *and* 32, *Contrexeville.*—While these hospitals were not thoroly equipped for the more extensive operative work, they were sufficiently equipped and had the officers to carry on the ordinary routine ophthalmic work of base hospitals, but with the formation of the center at Vittel the more complicated ophthalmic work could be transferred there.

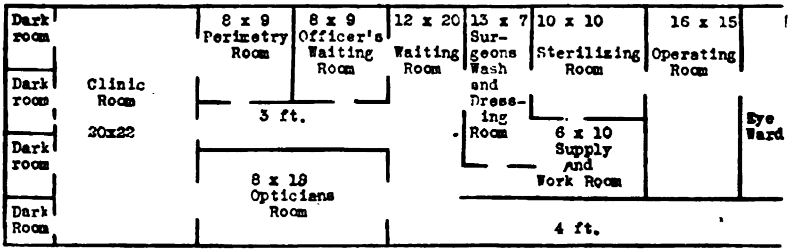


Fig. 1.—Arrangement of eye clinic rooms at Base Hospital 46. Three dark rooms across end of clinic rooms has been found a more practical arrangement than four for this width of building.

5. *American Red Cross Military Hospital* 1, *Paris.*—A visit was made to this hospital May 20. Lieut. (now Capt.) A. B. Fewell was carrying on the ophthalmic clinic with skill and energy. He had a very good equipment, including a giant magnet. Later, a small hand magnet was provided to complete the equipment of magnets. During the early part of June, after the battle in which the Second Division figured so bravely, a good many operations were performed in this hospital by the senior consultant and the assistant consultant to demonstrate various approved methods of handling ophthalmic battle casualties. Still later, Capt. F. W. Shine was assigned to this hospital and was made consultant for the Paris area. Thru the kindness of Colonel Hutchinson, the commanding officer, a good sized ward was set aside for ophthalmic cases, with

a well equipped operating room adjoining. Here Captain Shine and Captain Fewell performed many sight-saving operations and also a good many lid plastics. The work at this hospital had been fairly heavy from the start of the American offensive and had been carried on most efficiently.

6. *American Red Cross Military Hospital 2, Paris.*—This hospital was also visited May 20; and while it is a small hospital, it has been a very active ophthalmic center, due to the energy and ability of Lieut. W. B. Doherty. This has been one of the very bright spots ophthalmologically in the A. E. F. All of the operative work performed by Lieutenant Doherty was of very high order, and he had a splendidly equipped ophthalmic clinic, with the single exception of having no magnets, but with A. R. C. Hospital 1 so near, the magnet work could all be transferred there. Lieutenant Doherty has done more refraction work than most of the other ophthalmic surgeons in France and has fitted probably a larger number of artificial eyes, as all the difficult cases coming to the base optical unit have been referred to his clinic. He has fitted up his ophthalmic clinic with many admirable mechanical devices of his own making and has procured thru the American Red Cross many of the more intricate instruments not ordinarily furnished to base hospitals. Lieutenant Doherty's work has also been most highly praised by the assistant consultant in ophthalmology and by Lieut-Col. Nelson M. Black, one of our consultants in ophthalmology.

7. *Langres Center.*—The ophthalmic work here was in charge of Lieut. (now Capt.) Frederick Falk, tho all the operative ophthalmic surgery was transferred from here to Base Hospital 15 at Chaumont. Captain Falk was doing considerable refraction work in a small clinic in the center of the town and also some civilian work. This work was well carried on by succeeding ophthalmic surgeons, after Captain Falk was ordered away to join his unit.

8. *Base Hospital 66, Neufchateau.*—A visit to this hospital found Lieut. R. S. Beam in charge of the eye work, with a small clinic and a ward devoted to eye cases. He has carried on the work here up to the present with some help from the consulting ophthalmologists but the bulk of the ophthalmic surgery coming to this region was diverted to the eye center at Bazoilles.

9. *Evacuation Hospital 1, Sebastopool.*—A visit to Evacuation Hospital 1, which has really functioned as a base hospital, found Lieut. A. S. Rochester in charge of the eye work, but with inadequate equipment. Later, however, a large and small magnet were installed here under the direction of the senior consultant. A ward was set aside for ophthalmic cases and a clinic room was provided. Later, Capt. (now Major) Ralph A. Fenton was sent here to take charge of the eye work in this important post and under his unusually skillful guidance one of the finest advanced ophthalmic centers was developed and a great deal of skillful work performed. So excellent was the work of Major Fenton that he was the choice of the ophthalmic consultants to act as our consultant for the Third Army. He was followed at Evacuation Hospital 1 by Major G. I. Hogue.

10. At this time a number of camp hospitals were visited, but it was thought advisable for most of these to send their ophthalmic cases to the nearest base hospitals, rather than to have an ophthalmic surgeon assigned.

11. *Base Hospital 17, Dijon.*—A visit to this hospital found Lieut. (now Major) D. A. Campbell in charge of the eye as well as the ear work, which he carried on continuously in an excellent manner. One of the auxiliary optical units was assigned to this hospital. Patients from surrounding camp hospitals were sent here, and at one time a good many British wounded, as well as American, were treated.

12. *Evacuation Hospital 2, Baccarat.*—Lieut. Cyril Barnert was in charge of the eye work but doing no refraction, simply taking care of the ordinary eye service of a forward hospital. At one period Lieutenant Barnert had a very active experience treating the very severely gassed patients who arrived at this hospital. This hospital was only a few miles

back of the line and received the gas cases early. Lieutenant Barnert had a large bathing establishment for the gas cases, which was excellently equipped, so that as soon as patients arrived they were bathed and had their eyes and nasopharynx carefully treated, thus avoiding many of the more severe complications usually occurring. Later, two magnets were installed here, but realizing that this hospital could send cases needing the use of such instruments to Vittel, these magnets were removed to one of the forward evacuation hospitals just prior to the advance into the Argonne. Later, Captain Rau was placed in charge on the return of Lieutenant Barnert to his unit. A more efficient equipment was procured, including a trial case, and special rooms set aside for the eye clinic.

13. *Camp Hospital 27, Tours.*—This was one of the earliest hospitals, with Capt. Louis L. Henninger doing the eye work. One of the auxiliary optical units was established here. Later Capt. E. H. Cooper was assigned when Captain Henninger was sent to rejoin his unit. The optical unit rendered excellent service and a good deal of refraction work from this area passed through this camp hospital.

14. *Base Hospital* 8, *Savenay.*—An early visit was made to this hospital, which had always been a most important one in a most active and progressive center. Lieut. E. D. Loughran was in charge of the eye work, assisted by Lieut. R. E. Riemers. (Shortly after Lieut. Riemers was sent from this hospital to Evacuation Hospital 7, in which he served thruout all the trying times at Coloumiers and Souilly. Lieutenant Riemers had been indefatigable, patient and unassuming, performing general ward service as well as taking care of special work. No ophthalmic surgeon in the A. E. F. deserves greater praise than Lieutenant Riemers.) Later, at Base Hospital 8, Capt. Ray Connor was put in charge of the ophthalmic service and made consultant for the Savenay area. An entire ward was turned over to the ophthalmic service and a large room finally secured for the ophthalmic clinic. One end of the ward was partitioned off, making an excellent room for the preliminary instruction given here to the blind. This hospital has been very well furnished with ophthalmologic equipment other than magnets, the current here being such that magnets could not be installed. One of the first auxiliary optical units was assigned to this hospital.

15. Base Hospitals 27-34-101.—Visits to these hospitals found eye clinics established in all, with special wards for the ophthalmic cases. Base Hospital 101 was equipped with a magnet. Especially good work was done at Base Hospital 34 by Lieut. R. J. Sprowl and at No. 27 by Capt. (now Major) S. S. Smith, both of whom have carried on during the entire war in a most efficient manner. Lieut. Sprowl is one of our youngest ophthalmic surgeons and he has had one of the largest and best ophthalmic clinics in France. Later in the season one of the magnets made at the medical department repair shop was sent to Base Hospital 27.

16. *Base Hospital* 6, *Bordeaux.*—This hospital has, since its arrival in France, had an excellent clinic, with a most efficient officer in the person of Capt. Ralph Hatch. An optical unit was assigned here. Base Hospital 3 had no ophthalmic surgeon at the time of the first visit of the senior consultant and all the eye cases were being sent to Base Hospital 6. An eye clinic was later established at Base Hospital 3 under Lieut. Cyril Barnert.

17. *Base Hospital 24, Limoges.*—This hospital had a good eye clinic, presided over by Capt. Bahn, who was later made consultant for the Limoges area. This had been one of the most active eye clinics, and Captain Bahn had carried on with a very good equipment in a very excellent manner thruout the period of the war. An optical unit here would make the service more efficient and one was to be assigned on the arrival of the new units cabled for. Capt. Bahn's suggestions for standardizing of eye work and equipment were most excellent.

18. *Base Hospital* 1, *Vichy.*—This hospital had a small eye clinic in charge of Capt. W. W. Weeks, assisted by Lieut. H. L. Pelle, but this became unnecessary after the arrival of Special Base Hospital 115, tho it still continued caring for

some ophthalmic cases. Captain Weeks, during the active period of the war, did excellent work at some of the evacuation hospitals, both attached as ophthalmologist and on surgical teams. An auxiliary optical unit was first assigned to No. 1, but on arrival of No. 115 was transferred.

19. *Base Hospital* 20, *Chatel Guyon, and Base Hospital* 30, *Royat.*—Both of these hospitals had small eye clinics in the care of competent men and with fair equipment, especially Base Hospital 20, which brought over its own equipment, including two magnets.

20. Following these visits, base and evacuation hospitals arrived very rapidly and were visited as shortly after their arrival as possible by one of the consultants, either the senior consultant, Lieut.-Col. Allen Greenwood, the assistant consultant, Lieut.-Col. George S. Derby, or Lieut.-Col. Nelson M. Black, who was, late in the summer, attached to our general consulting staff. Advice and assistance were given to the various ophthalmic surgeons in these newer hospitals as to building up their clinics, or combination centers, and plans furnished. In October, a visit was made by the senior consultant to all the hospitals in Base Section 3 (England) and a list of suggestions sent to the Chief Surgeon, A. E. F., and a copy to the chief surgeon of Base Section 3 as to the need of officers, optical units and supplies. While in London the senior consultant improved the opportunity to purchase tools and supplies to outfit several of the auxiliary optical units being organized at the base unit in Paris.

II. CONSULTANTS

The senior consultant in ophthalmology for the A. E. F., Lieut.-Col. Allen Greenwood, was assigned to Consultant Headquarters at Neufchateau in May and the office of the division of ophthalmology was established there. As the service developed an assistant consultant in ophthalmology, Lieut.-Col. George S. Derby, was appointed for the A. E. F. and in September a third medical officer, Lieut.-Col. Nelson M. Black, with an appointment as consultant in ophthalmology was added to the force.

In the beginning, with only two evacuation hospitals (Nos. 1 and 2) in the field, it was possible to cover their work from the office at Neufchateau and also to give consulting service to the second line hospitals at Chaumont, Bazoilles and Vittel-Contrexeville, as well as to make a certain number of consulting tours through the rest of the A. E. F.

Moreover, at this time, but few medical officers were available, who could be put in charge of areas. As more base hospitals, and also the casual ophthalmologists cabled for, came to France, it was found necessary and possible to establish consulting areas which could run independantly or with only occasional assistance from the Neufchateau office.

With the establishment of many evacuation and mobile hospitals at the front, the senior consultant felt very keenly the necessity of supplying to those soldiers with wounds of the ocular structures the best available advice at the earliest possible moment. Therefore, a considerable amount of the time of the consultants was taken up with frequent visits to these front line hospitals and to the advanced base hospitals; and a good deal of routine and consulting operative work was performed by the consultants from this office in the evacuation and mobile hospitals during the offensives.

When the first extensive fighting of the American forces began, for the capture of the Chateau Thierry salient, the first influx of wounded men came into the evacuation hospital at Ecury sur Coole. There being no ophthalmologist in this area, the senior consultant and the assistant immediately proceeded to Evacuation Hospital 4 where they took care of the ophthalmic cases for this hospital, Mobile Hospital 2, nearby, and the field hospital at Chalons. Besides this, considerable time was spent in general *triage* and surgical work. As the scene of activity shifted more to the Chateau Thierry front the senior consultant proceeded to the evacuation hospitals in this area, while Lieut.-Col. Derby remained at No. 4, with orders to proceed to Paris as soon as relieved. The next ten days were spent by the senior consultant going as needed from Evacuation Hospital at Moulanglaust, to No. 8, at Juilly, thence to Red Cross Hospital 14, at Jouy sur Morin and to Evacuation Hospital 5, at Crepy. At Evacuation Hospital 7 the nights of July 28 and 29 were spent in doing *triage* work, the first night in a reception tent and the second night in an open field by the light of four lanterns. This experience was the basis of a number of suggestions made later to the Chief Surgeon with regard to the reception and *triage* of wounded men during an active offensive.

At the same time a systematic attempt was made to keep in close touch with the base hospitals of the intermediate and base sections. The Bordeaux and Clermont-Ferrand sections were visited twice from the consultant's office. The larger areas of Bordeaux and Limoges had local consultants, while later there was an eye consultant to cover the whole of Base Section 2. All other base hospitals in the A. E. F., with the exception of the more recently established, were more frequently covered and some with great frequency, such as Savenay, Vichy, and especially Paris, during the period of the Chateau Thierry activity. There were at the time of the armistice local consultants at Toul, Bazoilles, Vittel-Contrexeville, Allerey, Paris, Mars, Mesves, Vichy, Limoges, Nantes, Savenay and, as stated before, a consultant for Base Section 2, and also a consultant for Base Section 3.

In addition to the visiting of hospitals by consultants, circulars for the guidance of ophthalmologists were sent out from time to time by the senior consultant. This was more necessary owing to the fact that none of the manuals published in the Surgeon General's office ever reached France until after the armistice was signed. These circulars were also largely written answers to the numerous requests from opthalmologists for help and suggestions. A few officers brought with them Manual 3, which, according to their statements, was of great help in carrying out the various necessary surgical procedures. In any future expeditionary forces, hospitals of every kind on leaving this country should be supplied with an up-to-date medical library.

HEADQUARTERS MEDICAL AND SURGICAL
CONSULTANTS,
AMERICAN E. F. APO 731, FRANCE.
DIVISION OF OPHTHALMOLOGY,
6, SEPTEMBER, 1918.

CIRCULAR 1

I. *Gassed Eyes.*—Treatment of eyes injured by those gases which produce a chemical conjunctivitis (mustard base-dichlor ethyl-sulphid):

The earliest possible treatment is necessary to lessen the duration of the disability. The early treatment should be given at the first bathing. It should consist of a thoro flushing of the conjunctival sacs with a 1 per cent solution of the sodium bicarbonat, preferably warmed to body temperature. Care should be exercised to see that both the upper and lower cul-de-sac be thoroly cleansed.

Following this treatment the eyes should be washed out every four hours in severe cases, with either a solution of sodium bicarbonat, 15 per cent normal saline solution or a saturated solution of boric acid, and a drop of liquid petrolatum should be instilled after each washing. Olive oil may be used when liquid petrolatum is not available. Castor oil has been found somewhat irritating.

In the more severe cases corneal involvement of greater or less degree is common. This takes the form of a roughening and opacification of the corneal epithelium, leading to ulceration, and producing permanent damage of the eye and may even cause a complete loss of sight. Such cases always show marked photophobia and usually a contracted pupil, and require for treatment that a solution of atropin sulphat, 1 per cent, should be used sufficiently often to keep the pupil dilated and the eyes should be shaded from the light but never bandaged. As soon as the corneal or uveal disturbance has subsided the atropin should be discontinued; and it is advisable to get the patient up and accustom him to the light, to avoid long hospitalization of such cases. Secondary infection of the conjunctiva is common and may be treated by a solution of argyrol, 20 per cent, instilled three or four times a day. Self-induced relapses are not uncommon and should be watched for.

In the later stages when photophobia persists without signs of conjunctival irritation to account for it, it is advisable to use cold douching of the eyes two or three times a day and to employ the patient in some suitable light occupation.

Where corneal involvement is marked, the ophthalmic consultant should be asked to see the case.

II. *Injuries.*—Contusions of the eye without rupture. Guarded prognosis, watch tension, especially if traumatic cataract develops. Look for and record any choroidal injury.

Contusions of the eye with rupture. If extensive, with great loss of globe contents, enucleate. If less extensive, with little loss of contents, suture and cover with conjunctival flaps after freeing wound of any prolapsed tissue.

For penetrating wounds, with foreign body inclusion probable, the magnet test should be applied. If this shows foreign body to be magnetic, remove by magnet, preferably by anterior route if small, and if large thru the wound of entrance, if unable to remove small foreign body with the magnet at hand, route cases if possible to the base eye center, location of same to be designated later. Where foreign body is nonmagnetic and not easily removable, follow expectant treatment, as such foreign bodies are often encysted.

It should be especially emphasized that penetration of the eye by a foreign body, without a discoverable wound of entrance, is not an uncommon occurrence. All suspicious eyes should, therefore, be thoroly investigated for a foreign body, by means of the magnet, the ophthalmoscope and by the X-ray when necessary.

Penetrating wounds without foreign body inclusion should be immediately covered with a conjunctival flap after freely removing prolapsed tissue, then treated as any eye wound. Where an eye is too badly injured to save or where sympathetic ophthalmia is to be feared and no vision is likely to result from conservative treatment, the eye should be enucleated. At time of enucleation some material, preferably one of the large glass spheres, should, if possible, be implanted in Tenon's capsule. If this cannot be done, it is at least imperative that the four recti muscles should be sutured together.

In penetrating injuries of the eye, showing proptosis to a greater or less degree, a thru and thru perforation of the globe should be suspected.

Panophthalmitis.—When a penetrating injury results in panophthalmitis it is best to eviscerate and this operation should be the one chosen for a hopelessly injured eye complicated by orbital cellulitis.

After enucleation or evisceration an artificial eye should be fitted as soon as the socket permits.

An only eye, or both eyes should never be removed without the advice of the consulting ophthalmic surgeon. The senior consultant in ophthalmology should be notified of any soldier blinded, or likely to be blinded, as a result of injury or disease.

Orbital Injuries.—A small foreign body in the orbit not easily accessible should be left unless cellulitis develops. Larger bodies should be removed avoiding injury to muscles and nerves.

Orbital cellulitis requires free drainage.

Perforating wounds of the orbits by bullets or other missiles should be treated symptomatically. Lagophthalmos from the extreme exophthalmos often seen in such cases or the lagophthalmos resulting from facial palsies should have the lids sutured together to protect the eye if there are any signs that the cornea is likely to become involved.

Brain Injuries.—All brain injuries or severe cranial wounds likely to show brain involvement should be frequently examined by the ophthalmic surgeons and all opportunities should be improved for studying the fundi and fields of vision of such cases.

III. *Trachoma.*—The possibilities of the introduction and spread of trachoma among the men of the A. E. F. require that every effort be made toward its prevention. Cases of trachoma are bound to be discovered among our troops. Cases showing trachoma in the contagious stages or suspected of being in this stage should be immediately sent to a special base eye center for treatment and cure. Such cases should be segregated at the special center until cured.

Section 3 does not refer to foreign labor in the employ of the A. E. F. Special arrangements will be made for handling trachoma occurring in these units.

IV. *Refraction.*—Each hospital in which refraction is done should requisition a sample set of army spectacle frames from Base Optical Unit, A. P. O. 702. These frames are number 1-2-3. In ordering frames specify the number of frame which fits best, give the interpupillary distance and, in special cases, designate the amount of offset or inset (this may be read off from the trial frame).

An eye record slip will shortly be issued and is to be filled out for every case refracted. Under sph., cyl., ax. record glasses ordered, or, if no glasses ordered, record error of refraction found. Note whether cycloplegic used and whether glasses were ordered. Other notations explain themselves. This slip should be pasted inside the cover of the pay book to be issued to troops after October 1 or, if that is unavailable, inside the spectacle case.

It is desirable that a cycloplegic be used as a routine except in those cases where it is unnecessary or contraindicated.

On account of the great scarcity of atropin and homatropin, these drugs must be conserved in every possible way. It is suggested that for mydriasis cocain be used as far as possible, and for cycloplegia an oily solution of homatropin 1 per cent and cocain 2 per cent be employed. Instill one drop in each eye and wait 45 to 60 minutes before refracting. By this method a fairly satisfactory cycloplegia can be obtained.

Glasses are to be ordered only when a refractive error exists which materially interferes with the efficiency of the soldier.

Prescriptions for toric lenses for soldiers and noncommissioned officers will not be filled.

V. *Reclassification.*—Troops will be reclassified as to vision, according to the G. O. 10 Hq. S.O.S., April 12, 1919. For your information a copy of this order is appended. In interpreting this order, a certain amount of latitude is allowed the ophthalmic surgeon to the end that men with useful vision, but not strictly within the above standard should not be lost to the service.

Copy of G. O. 10, G. H. Q., S. O. S.
France, April 12, 1918.
Headquarters, S. O. S.
G. O. 10.

ABSTRACT.

The following standards will govern in cases of eye defects:

Class A.—To include men with uncorrected vision 20/40 for the better eye and 20/100 for the poorer one, provided no organic disease exists in either eye.

Class B.—To include cases of toxic amblyopia, active choroiditis, interstitial keratitis, ocular paralysis with diplopia, anterior or posterior synechia, if awaiting operation, and trachoma.

Class C.—To include men with uncorrected vision of less than 20/40 and 20/100 and men with a correct vision of 20/70 in one eye and the other being amblyopic or blind.

Class D.—To include men with corrected vision of 15/200 or less in each eye, men blind in one eye, with corrected vision in the other of 20/70 or less: men with glaucoma, retinitis pigmentosa, optic nerve atrophy, high myopia with extensive fundus changes and disseminated choroiditis.

A recommended change of standards for reclassification is shown on page 37.

VI. *Records.*—For the purpose of later investigation, it is requested that you keep in your department a record of the name, number, organization and home address of those patients in whom the diagnosis of an intraocular foreign body has been made. This is not meant to include cases in which the eye has been removed.

It is also requested that you keep a careful record of all gas cases developing a *definite corneal ulceration,* as well as of other cases of special interest.

VII. *Pathologic Material.*—Enucleated eyes or other pathologic material which requires examination by a specially trained pathologist should be placed in ten per cent (10%) [formaldehyd] formalin solution and held, pending directions for forwarding. These specimens should be labeled with the name and number of the cases and essential notes of the clinical condition.

VIII. *Pterygia.*—Pterygia should not be operated on in France unless seriously interfering with the efficiency of the individual.

IX. *Strabismus.* — Strabismus cases should be operated only under exceptional circumstances.

Allen Greenwood,
Major, M. C.,

CIRCULAR 2.

9th October, 1918.

I. *Glasses for the American Expeditionary Forces.*—Ophthalmic Surgeons in the A. E. F. are requested to exercise great care in prescribing weak lenses. Many prescriptions have been sent to the optical units for simple 0.25 cylinders.

Men who are not doing confining clerical work rarely, if ever, need a glass of this strength. It is also very seldom that 0.50 cylinders are needed unless the axes are oblique or against the rule. Because a soldier is sent down for an examination of his eyes and a weak error of refraction is found, it must not be considered necessary on this account that glasses be ordered when some good advice regarding the care of the eyes will probably accomplish the desired result. No hard and fast rules can be laid down and ophthalmic surgeons must use their judgment but keep in view the matter of not overburdening the optical units.

II. *Signing Prescriptions.* — Ophthalmic Surgeons must sign all prescriptions for glasses. All orders for supplies sent to the base hospital unit must be in duplicate and sent thru the commanding officer.

III. *Adjusting Optician.*—It is suggested that the ophthalmic surgeons make inquiry, thru proper authorities in the hospital where they are on service, to see if, among the hospital enlisted personnel, a good adjusting optician may be found who might be available for service in the eye clinic.

IV. *Wounds of the Eyelids and Adjacent Parts.*—Extensive debridement of wounds of the eyelid and adjacent structures is seldom necessary, it being of greatest importance for the proper function of the eye that every effort be made to save tissue in wounds involving the lids and adjacent structures. Primary repair of almost all of these wounds should be attempted and this will obviate the necessity of much secondary plastic work. In very extensive wounds it may be necessary to insert a small drain in one corner. Special attention is called to the necessity of early and accurate repair of wounds of the lower lids with special reference to those involving the inner portion.

V. *Orbital Wounds.*—Orbital tissues should be conserved in doing enucleations and eviscerations. An orbit should never be packed but where an orbital cellulitis exists a small drain is often advisable. An evisceration leaves a very good stump and this operation should be the one selected for a ruptured and collapsed eyeball and for a panophthalmitis. It should be the operation of choice where a good clean enucleation, with implantation of glass ball, is not practicable. Glass balls may be obtained on requisition from the Inter. Med. Supply Depot No. 3.

CIRCULAR 3.

22, November, 1918.

I. *Artificial Eyes.*—Four centers have been established where men requiring artificial eyes can best have them fitted, Base Hospital No. 6, at Bordeaux, Base Optical Unit, Medical Department Repair Shop, Paris, Base Hospital No. 8, at Savenay and Base Hospital No. 65, near Brest.

Cases requiring plastics on the eyelids or orbit, prior to the fitting of an artificial eye, should be routed to Base Hospital No. 115, if practicable. Such cases appearing in Paris may be sent to A. R. C. M. H. No. 1 or No: 2.

II. *Trachoma.*—Cases of trachoma which occur among the troops can be treated in the Base Hospitals, but precautions should be taken to prevent any danger of spread of the disease. Special care of towels and handkerchiefs is most necessary. Severe cases likely to require long treatment, with resultant impairment of vision, should be classified "D" and routed accordingly.

III. *Technic of Glass Sphere Implantation in Tenon's Capsule.*—(Frost's operation.) These suggestions are intended for surgeons who have not been accustomed frequently to perform this operation:

(*a*) The eye should be enucleated in the ordinary manner except that the four recti muscles should be isolated and secured separately, either with a small artery clamp or with a stitch and should be laid back out of the field of operation. The cavity should then be packed until dry.

(*b*) The edges of Tenon's capsule should now be seized at four points with artery clamps, and a glass ball, 18 to 22 mm. in size, should be inserted.

(*c*) Silk of sufficient strength is used thruout for suture material. Tenon's capsule is closed with three or four sutures placed in the horizontal line. The muscles are next sutured, superior rectus to inferior, external to internal. The conjunctiva is now closed with three or four sutures in the horizontal line.

(*d*) Extrusion of the glass ball will not occur, except under extraordinary conditions, unless a definite infection of the socket exists. A certain amount of reaction is practically always to be expected following the operation. The conjunctival sutures should be removed when the reaction subsides.

IV. *Plastic Work on the Eyelids.*—In many cases requiring plastic work on the eyelids the condition is complicated by defects of the orbital margins and of the fleshy and bony structures of the face. Much progress has been made during this war in facio-maxillary surgery. Our mutilated soldiers are entitled to the best professional advice obtainable and in few cases of this nature is a delay of one or two weeks of any importance to the patient.

Our larger hospital centers, such as Base Hospital No. 115, at Vichy, are especially equipped for this reconstructive work. These cases need special study and often tax the ingenuity and skill of the best trained men. If you are not well equipped to handle this work and if you have not the opportunity to obtain the cooperation of an experienced facio-maxillary surgeon, do not operate, but send the case on to a center where this combination is available.

V. *Refraction.*—Read Circular No. 1 in regard to eye record slips. These slips should now be available in every clinic. They should be filled out in all instances in the clinic where refraction is done. All spaces should be filled in and a note made as to whether a cycloplegic has been used. The slip should then be pasted inside the cover of the pay book, which has been issued to each enlisted man. If the enlisted man does not have his pay book with him he should be required to bring it.

VI. *Perimeters.*—Hand perimeters can be obtained from Inter. Med. Sup. Depot, No 3, American E. F., APO 737, France.

Allen Greenwood,
Lt.-Col., M. C., U. S. A.,
Senior Consultant in Ophthalmology.

From the personal experience of the senior consultant in ophthalmology and those assisting him, who have visited various ophthalmic clinics, particularly those of isolated base hospitals, the value of such visits has been enormously apparent. The thought that someone is interested in their work is very stimulating to the young ophthalmologists in such clinics. They are eager to receive the advice given in regard to various operations and procedures and become much more interested in their work. They are stimulated to study cases more carefully so that they can present them in a satisfactory manner in case of future visits from the consultant.

During the summer and fall the senior consultant urged the men he visited to do as much research work as possible, to write interesting descriptions of their cases and to make illustrations. Different men were assigned different forms of ophthalmic injuries or diseases for their particular study. They were instructed in better methods of keeping records and in the more up-to-date methods of treating traumatic conditions. The men in centers were encouraged to organize frequent meetings for mutual help and study; and the spirit of cooperation between the senior consultant and the ophthalmologists thruout France left nothing to be desired and was most gratifying and stimulating.

III. OPTICAL DEPARTMENT.

1. *Optical Units.*—The base optical unit, with eight auxiliary units, was authorized by cable to the War Department A.G.O., Feb. 25, 1918, and was organized in the Surgeon General's office by the author. The units were mobilized at Camp Crane, Allentown, Pa., in March, 1918, and left the United States April 26, 1918, arriving in France May 4, 1918. These units had an authorized strength of one officer and thirty-six men and left the United States with one officer and twenty-nine men. The present strength of the unit is one officer and seventy-nine men, Capt. (now Major) F. H. Edmonds, S. C., in command.

The equipment, stock and machinery was released for the base unit from New York City, March 15, 1918, and thus the heavy machinery, amounting to nearly nineteen tons, was shipped from the United States before the men left, but on the arrival of the unit in France, the machinery had not been located. Part of it, however, reached Paris on July 4, 1918. The result of this delay was that the personnel of the base unit was partially idle for nearly two months; and this heart breaking delay in getting to work prevented the sending of replacement lenses to the eight auxiliary units which were sent out shortly after their arrival in France. This lack of replacement lenses was never fully made up.

While awaiting the machinery, facilities were afforded for a number of the members of the base unit to work in the shop of E. B. Meyrowitz grinding lenses for the A. E. F. This opportunity was due to the kindness of Mr. Lambrecht, who helped in every way he could during the time before the machinery arrived. Dr. Louis Borsch, of Paris, was also of much help in aiding Major Edmonds to obtain many of the much needed minor supplies.

The remainder of the machinery arrived in Paris Sept. 29, 1918. The building for the shop was completed July 24, 1918, and was located first at Neuilly, with the instrument repair shop, but was later moved to Porto St. Cloud to be with the medical department repair shop.

The shop was partially in operation July 27, 1918, but not in full operation until October 1, 1918.

The machinery and equipment supplied was based on an approximate production of 100 pairs of glasses per day.

From July 27, 1918, to December 1, 1918, the production was as follows: 21,828 prescription jobs, 3,091 smoked spectacles, 1,620 repair jobs. The unusual nature of the prescriptions received caused many complications, necessitating the manufacture of special tools and gauges. Prescriptions for spherical lenses as high as 12.00 D and cylindrical lenses as high as 10.00 D were received and filled. *Fifty per cent of the prescriptions received averaged spherical from 2.00 to 5.00 D., in combination with cylinders from 1.50 to 5.00 D.*

The equipment of the shop is given below:

7 Hand surface grinding machines.
4 Automatic cylinder grinding machines.
6 Automatic edge grinding machines.
3 Hand edge grinding machines.
1 Diamond drill.
1 Diamond cutter.
3 pairs spherical grinding tools.
29 pairs toric cylinder grinding tools.
Complete small tool outfit, such as buffs, centering machines, neutralizing instruments, files, pliers, etc.

The surface grinding machinery was not designed for the unexpected amount and unusual character of work received. Rough cylinder blanks or optical machinery were not available in France. To produce these lenses from rough glass stock with the limited number of cylinder machines designed for special work was slow and unsatisfactory even with a full day and night force in operation.

A special attachment was devised to supply the demand for prescription lenses in gas masks. This attachment fastened over the eye cups of the masks and contained a 47 mm. lens so decentered as to give the proper pupillary distance.

Nearly a thousand prescriptions for glasses came into the shop prior to the setting up of the machinery and there has been a steadily increasing flow of prescriptions ever since, taxing the personnel to the utmost. At the time the author left France the base optical unit had sufficient machinery and men to care for the prescription and repair work of the entire A. E. F., but, owing to the slowness with which the supplies had come to hand, it had never been possible to take full advantage of the facilities, and at that time it was particularly embarrassing, owing to the failure of the newly arrived auxiliary units to bring their supplies with them as directed by cable. Counting on this supply, the stock at the base unit was heavily drawn on to provide the supplies for the newly organized units sent to Mesves Center, Base Hospitals 29 and 33 and the two units sent to the Army of Occupation.

All this has entailed a great deal more surface grinding than was originally intended, and to meet this the shop has been run at times at night, as well as day, on an eight hour shift.

The shop as it was finally in full operation was a model of its kind and was praised by the manager of the English spectacle depot and by the consultants of the British ophthalmological service.

2. *Auxiliary Units.*—As soon as the hospital situation could be sufficiently studied by the senior consultant the auxiliary units were assigned as follows:

1. One unit to Base Hospital 15, where a room near the headquarters building and opposite the eye ward was turned into an optical shop.
2. One unit to Base Hospital 18, where a special room was assigned.
3. One unit to Base Hospital 25, tho later this unit was transferred to Base Hospital 36, where an eye center was established.
4. One unit to Base Hospital 1, later transferred to Special Base Hospital 115, on its arrival.
5. One unit to Base Hospital 6.
6. One unit to Base Hospital 8, where an eye center was established.
7. One unit to Base Hospital 17.
8. One unit to Camp Hospital 27.

These units immediately began to do excellent work and were much appreciated. While organizing these auxiliary units in the United States the senior consultant fortunately arranged that they carry with them, as personal baggage, all of their supplies. Therefore, they had a good supply of cut and edged lenses, and frames, with all necessary adjusting tools, so that all ordinary prescriptions could be filled at once, thus saving the day for these optical units. Later they were handicapped by the lack of replacement lenses mentioned before as being due to the late arrival of machinery and supplies for the base or replacement unit. By circularizing the ophthalmic surgeons of the A. E. F., an attempt was made to lighten the increasing burden on the optical units by discouraging the ordering of weak plus and minus spheres and cylinders unless very positive indications were present pointing to their need. (Circular 2.)

With the increase in numbers of the troops and hospitals in the A. E. F., it became apparent that additional units would be needed. In fact, many hospitals and hospital centers made strong appeals for optical units. There were three ways of supplying this insistent demand, a demand which shows how much the optical units were needed: (1) by cabling for new units to be sent over fully equipped. This was done by the Chief Surgeon and six new auxiliary units asked for; (2) by using opticians found among the personnel of the base hospitals and supplying them with equipment; (3) by using opticians already connected with the optical shop or auxiliary units and supplying them with equipment.

Pending the arrival of the units that were cabled for, units were organized by the second and third methods and placed as follows:

1. One at the attending surgeon's office at Paris, made up at the base optical unit.
2. One at the Mars Center, making

use of the men already there and equipping them.

3. One at Base Hospital 29, made up at the base optical unit.

4. One at Base Hospital 33, made up at the base optical unit.

5. Two for the Army of Occupation, made up at the base optical unit.

6. One for the Mesves Center, made up at the base optical unit.

Units were requested for the following places and they were to be supplied as soon as the equipment for the six new units arrived:

1. Base Hospital 65, Brest (most urgent).
2. Base Hospital 38, Nantes Center.
3. Base Hospital 27, Angers.
4. Base Hospital 45, Toul Center.
5. Base Hospital 24, Limoges.

In spite of all the discouraging delays, it was felt that the base optical unit and the auxiliary units creditably filled a place in the medical department of the A. E. F. They were a new feature for the medical department and more or less experimental, but the organizer considers that the worth of such an organization for expeditionary forces has been proved.

3. *Mobile Optical Units.*—Authority was requested to equip two mobile units, and this office was asked to submit plans, but the cessation of hostilities and the expected arrival of new auxiliary units, with double equipment, made the project seem unnecessary. For serving the shifting mobile and evacuation hospitals in an advanced area, this plan would have been most helpful and merits consideration for the future. It was expected to make these mobile optical units more independent than were the auxiliary units by the addition of an edging stone and a supply of higher number lenses. They would thus have been small mobile shops, requiring a driver for the motor car, a skilled optical mechanic and an adjuster, and taking their power from the motor of the truck. With two such mobile shops for the advancing troops, with the big base shop as outlined in the foregoing, with a sufficient number of auxiliary units, and, above all, with means of rapidly transporting finished orders to all points, an optical division could give the maximum of service to an expeditionary force.

4. *Suggestions for the Future.*—As a result of actual experiences, mistakes and delays, the following suggestions are offered for future organizations:

(*A*) *Base Unit.*

1. The base unit should start out with larger supplies of blanks and surface ground lenses, and adequate arrangements should be made for a monthly automatic supply.

2. More experienced men who have had an extensive shop (surface and edge grinding) experience would be advisable.

3. An independent power plant in case of a breakdown in the electric current ordinarily supplied.

4. Besides the commanding officer, two commissioned officers should be attached to future base optical units. (At the time the author left France, Major Frank H. Edmonds was in charge of seventy-nine men, with no commissioned officers between him and the first class sergeants. An effort to rectify this state of affairs, which was palpably inefficient, was made, but the cable in regard to new commissions prevented this.)

5. An additional set of surface and edge grinding machines would be advantageous in case of any breakdown of the ones usually in use.

6. Adequate means of quickly transporting finished supplies to all the areas fed from the base optical unit. Too much stress cannot be laid on this suggestion. In numerous instances a delay of from three to six weeks occurred between the time of shipment from the base unit and the arrival of the goods at the hospital or auxiliary units, which frequently meant that glasses arrived long after the men to receive them had been discharged and, therefore, hard to follow up, or men were hospitalized much longer than should have been necessary. Many times goods never reached their destination, requiring a duplication of the order. A number of the more distant hospitals sent their own messengers to bring the finished orders back from the base unit. With the increasing evidence of these delays, arrangement was made with Lieut.-Col. Jones of the medical department repair shop to send some of the

larger shipments by a courier from the base optical shop, and it was imperative that this direct courier service be greatly extended until it covered the entire territory. The following letter was sent to the Chief Surgeon as appertaining to this suggestion:

American E. F., APO 731, France,
9th December, 1918.

From:
Senior Consultant in Ophthalmology.
To:
Chief Surgeon (Attention Colonel Shepard), thru Director of Professional Services, A. E. F.
Subject:
Improvement in forwarding optical supplies from the Base Optical Unit.

1. On November 26th, a circular was sent to the Commanding Officers of the Base and Evacuation Hospitals in order to get data for making up the final report of the Ophthalmic Service to the Chief Surgeon. Many answers have been received to this circular and a great many of them call attention to the fact that glasses sent out from the Base Optical Unit are delayed several weeks in the Parcel Post. It was realized that this method of sending glasses from the Base Optical Unit was slow but it was not known that the delay was generally so great. Recently when large shipments have gone out from the Base Optical Unit a courier messenger has carried them from the shop to their destination. It would vastly improve this service if some arrangements could be made with Lt.-Col. Jones, the Commanding Officer of the Medical Department Repair Shop, for the assignment of several messengers from the Base Optical Unit to aid in the delivery of finished goods.

2. The Base Hospital Unit is so well supplied with men at the present time that two or three men could readily be assigned to this duty and it is felt that the financial outlay involved will more than be met by the saving from the present loss by using the package mail service. One courier per week for the four principal directions, namely, Chaumont and Bazoilles—Mesves, Mars and Vichy—Bordeaux and intermediate points—Savenay and intermediate points—would probably make the handling of this problem more efficient.

Allen Greenwood,
Lt. Col., M. C., U. S. A.

7. Two small completely equipped base shops, one in the advance section and one in the base section, would be advantageous.

(*B*) *Auxiliary Units.*

1. A double equipment of cut and edged lenses with a supply of these lenses running into much higher numbers, such as cylinders up to 4.50, running from 2.50 to 4.50 by half diopters.

2. Each auxiliary unit should be supplied with a hand edging stone.

The two foregoing suggestions would make future auxiliary units much more independent of the base optical unit and remove a little of the excessive burden from the parent unit.

5. *Artificial Eyes.*—Fortunately, at the last minute, before leaving New York, 1,000 artificial eyes were added to the equipment of the base optical unit. During the summer 200 artificial eyes were selected by the senior consultant from the supply in the hands of a manufacturer in Nantes, and still later, 500 artificial eyes were sent over as part of the equipment of Base Hospital 115.

A selection of artificial eyes was also expected as part of the equipment of the new optical units on their arrival.

At first, small supplies of artificial eyes were sent to various base hospitals; but this plan was evidently a mistake, as it was often impossible to find in the small collection sent an artificial eye suitable for the individual case. It was, therefore, decided to establish centers for the fitting of artificial eyes. Accordingly a large supply was left at Base Hospital 115, at Vichy and also at the base optical unit at Paris, and a supply sent to the port of embarkation for D cases at Savenay. After the decision to embark D cases from Bordeaux and Brest, a supply of artificial eyes was sent to Base Hospital 6 at Bordeaux and to Base Hospital 54 at Brest. A small supply was sent to Base Hospital 29, at Tottenham, England, as a number of men requiring artificial eyes were found in the various hospitals in Base Section 3 at the time of the visit of the senior consultant.

It was thus hoped that no soldier who could be fitted with an artificial eye would be sent home without one.

Arrangements were made for those soldiers requiring minor plastics, before the fitting of artificial eyes, to have this work done at Vichy, Paris, Savenay and to a smaller extent in all the base hospitals. Men requiring more extensive plastics to enable them to wear an artificial eye were routed to Vichy, or classified D and sent to the United States.

IV. CARE OF THE BLIND.

Some of our soldiers have made the sacrifice which comes next to the supreme one of loss of life, when they have received injuries depriving them of all useful vision. Fortunately, the number of our battle blind has been much less than might reasonably have been expected.

It was felt that everything possible should be done to give these men courage, without undue and misplaced sympathy; and at first it was thought possible that they might be routed to the port of embarkation and sent *at once* to the hospital at Roland Park, Baltimore, conducted by Lieutenant-Colonel Bordley. the director of the Red Cross Institute for Blinded Soldiers and Sailors. In view, however, of the experience of Great Britain in handling this problem, as far as it concerned blinded Canadians and Australians, it was apparent that the immediate shipping of blinded men was apt to have a disastrous mental effect, and it became necessary to provide means of giving these men some preliminary training in the A. E. F. to tide them over their first discouragement and to make them better able to care for themselves and appreciate the fact that, while deprived of the most useful sense, they still, by the use of others, could accomplish wonders and be made useful and happy citizens. Having gained this confidence in themselves, they could then be transported to the United States with greater certainty of arriving in good condition.

At first, for a short time, in carrying out this preliminary training, the services of Miss Winifred Holt, who had done wonderful work among the French blinded soldiers in her *Phare de France,* were made use of, and she and her assistants visited the first American blind in Paris and Savenay. Later, Miss Dorothy Richardson, one of Miss Holt's workers, carried on the work, under Miss Holt's supervision, with the first blind sent to Base Hospital 115 at Vichy. Here excellent preliminary training was given to a few blind until they were ready to go to the United States. On the giving up of this small center for the preliminary education of the blind, Miss Holt ceased her personal services but released her assistant, Miss Richardson, to enter the employ of the A. E. F. as a civilian employe for the preliminary instruction of the blind. Miss Dorothy Richardson's services were invaluable to the A E. F. in the emergency and she was at once put in charge of the blind work at Savenay, where a much larger school was established and where at one time she, and her assistants, had thirty-five blind men to teach. (The funds for carrying on this work were furnished by Lieutenant-Colonel Bordley.) With the exception of a very small number, all of our American battle blind came under the care of this capable young woman.

At this time the Red Cross was requested by the Chief Surgeon, at the suggestion of the senior consultant in ophthalmology, to cable for Major Migel to come to the Red Cross headquarters in Paris, to assist in carrying on this work, under the supervision of the senior consultant in ophthalmology. In view of the fact that the blind were to be sent to a Red Cross institute in America, this arrangement seemed peculiarly fitting.

The Chief Surgeon, at the suggestion of the senior consultant in ophthalmology, also cabled for eight reconstruction aids, qualified to give preliminary instruction to the blind, to be placed, on their arrival, at the disposal of the senior consultant. It was intended to send two of these aids to Savenay, two to Vichy, one to Vittel, one to Red Cross Military Hospital 1, in Paris, one to Bordeaux and one to England. Tho the cable was sent in August, these aids did not arrive until late in December, but there was still work for them and they were very welcome. They were brought by Major Migel as Red Cross aids and at once became of great help in carrying on the work.

When it became apparent, early in the last drive at St. Mihiel and the Argonne, that a number of blind were to come down to Savenay, it was decided to organize there a school for their preliminary instruction. As mentioned before, this was placed in charge of Miss Dorothy Richardson, who was ably assisted by Mr. Baker, a teacher of the blind, himself blind since 6 years of age, who was kindly released for this work by the A. B. F. B. Fund organization. This organization also furnished a sufficient supply of typewriters, Braille primers, games and other appliances for the preliminary instruction of the blind. Later there was added to the teaching force a Red Cross worker, Miss Rose Thorndike, a reconstruction aid, Miss Harvey, and two of the aids brought by Major Migel. Just before the school was established at Savenay the senior consultant visited Hospital 8, on receiving notice that several blinded soldiers had been admitted, and found a very sad group of men in the ophthalmic ward and a general air of depression thruout. Steps were at once taken to have Mr. Baker sent to Base Hospital 8. A few days later, on making a second visit to Savenay, a most striking change was observed. Mr. Baker had arrived and had voluntarily occupied a bed in the ward among the blind soldiers. The influence of his cheerful personality coupled with the knowledge that he had done such successful work as a blind man was very great. The men were singing, laughing and, a little later, were listening to stories that Mr. Baker was relating. The help of having such a man living with these blind soldiers and taking part in their activities, telling them about his personal experiences and encouraging them to help themselves was, thruout the time of his service in Savenay, of untold assistance.

During the summer Mr. W. W. Stamm, formerly secretary to the Pennsylvania Association for the Blind and a Y. M. C. A. worker in France, was commissioned a first lieutenant in the Sanitary Corps and made several trips with the blinded soldiers from the forward areas to Savenay. The largest group to be sent home departed about December 13 and consisted of twenty-seven blinded men, with Lieutenant Stamm in charge, who left with orders to proceed with them to the institution at Baltimore. All of these twenty-seven soldiers had received from three to eight weeks' training and all reached the United States in good shape.

The work at Savenay has had a very striking influence on the morale of the blind men collected there and it is felt that this work has been carried on in a very satisfactory manner.

From statistics at hand it can be stated that the number of American soldiers, totally blinded from battle injuries during the period from the time the troops first came to France up to the present, will be slightly less than one hundred.

V. RECLASSIFICATIONS.

Since it seemed that an improvement could be made in standards of visual classification adopted for the A. E. F., the matter was taken up by the division of ophthalmology and the following classification submitted to the Chief Surgeon and later adopted:

Class A.—To include men with uncorrected vision of not less than 20/40 for the better eye and not less than 20/100 for the poorer eye, providing no organic disease exists in either eye and with good field of vision.

Class B.—To include cases of active organic disease of the eye, or conditions the result of trauma, in which recovery with vision not less than that required for Class C, may be expected within a reasonable length of time.

Class C.—(1) To include men with vision correctable with glasses to not less than 20/100 in *each eye*, with a good field of vision and provided no active organic disease exists; (2) men with one eye amblyopic, blind or lost, provided the remaining eye has vision of not less than 20/100 correctable with glasses to 20/50 and showing no organic disease.

Class D.—All men not included in the foregoing three classes.

VI. MAGNETS.

It is thought wise to make this separate heading owing to the importance of magnets in ophthalmic surgery.

Some emergency ophthalmic surgery is possible with rather indifferent equipment, but nothing can take the place of the giant and small magnets in handling those cases in which a small magnetic foreign body is lodged within the globe. It was immediately apparent during the early visiting of hospitals that this was one of the most urgent and necessary articles of equipment, for, with only a few base hospitals thus equipped, it would be impossible for the ophthalmic service properly to handle this very important branch of the operative work.

A supply of magnets had been shipped, following a request by cable in the very early spring, but at first no trace of them could be found. They were finally located by the commanding officer of Intermediate Medical Supply Depot 3, as listed under roentgen-ray supplies.

This early supply was immediately expended by sending the magnets to the points where they were most likely to be needed in case of an emergency. Giant Lancaster and small Lancaster magnets were placed in the two forward evacuation hospitals (Nos. 1 and 2), large and small magnets were placed at Chaumont and Bazoilles, and these, with the similar equipment at Base Hospital 36, temporarily filled in the gap. A small Lancaster was placed with the giant Volkman already installed at American Red Cross Military Hospital 1.

No further magnets arrived for some time, so that in order to meet the very insistent demand from all base hospital centers not equipped, arrangements were made to build some giant magnets at the medical department repair shop in Paris. Specifications for such a giant magnet were furnished from this office, based on the specifications of the model used by the English service, and five unusually good giant magnets were turned out.

It is interesting to note that up to 1918 the B. E. F. had three eye centers equipped with magnets (Boulogne, Etaples and Rouen). These centers possess large but immobile giant magnets. To cover their other areas they had an ambulance which carried a large Haab magnet and a small hand magnet. Following

Fig. 2.—Group of blind soldiers at the Savenay school. Mr. Baker is seen standing at the extreme left in the back row and Miss Richardson at the right.

the arrival in France of U. S. A. Base Hospital 5, which was equipped with the large and small models of Lancaster magnet, the British took up the question of supplying more of their hospitals; and basing their work on the magnets of Base Hospital 5, they turned out a very satisfactory model. The plans of this British model were supplied to our division of ophthalmology.

About the time the first magnet was finished at the shop, Lieut.-Col. Nelson M. Black arrived in France, bringing with him five medium sized magnets. These, with a few extra Lancaster magnets, which arrived a little later, made it possible to place magnets at all the most needed points among the mobile and evacuation hospitals.

Many of these magnets have been of assistance in other branches of surgery, particularly in brain surgery.

The following suggestion is made for the future: In view of the wide usefulness of magnets and the imperative need of them for the removal of magnetic foreign bodies from the interior of the eye, and for the diagnosis of such cases, it is strongly urged that every base hospital in any expeditionary force be supplied with a giant and a small magnet. Experience has proved that these magnets, built according to the Lancaster design, or a similar one, are by far the best and most easily transported. At times when battle casualties are not to be expected, or when an army is on a peace footing, magnets are occasionally necessary, but could be much more widely scattered.

Magnet Cars.—Both the English and French have found that a motor car, with special body and equipped with a dynamo, run by the engine, so that a giant magnet could be carried about and furnished with a suitable and sufficiently powerful electric current, was very useful. Prior to the cessation of hostilities, various types of such motor cars were investigated by the senior consultant with the intention of recommending one for the medical department; but when the necessity for such a car no longer existed the project was abandoned. The urgency of such a portable outfit for the A. E. F. was lessened owing to the fact that our mobile hospitals had such electric current producing cars or had portable gasoline driven dynamos, delivering a direct current suitable for the magnets. Therefore, magnet equipments were placed with the more advanced and isolated of these hospitals.

VII. REPORTS FROM OPHTHALMIC SURGEONS.

Early in June a circular letter was sent from the office of the senior consultant in ophthalmology to all ophthalmic surgeons of the A. E. F., requesting them to send a monthly report of the work done in the department which they had charge of. The reports were generally sent in and proved very interesting, and a compilation of them was sent each month to the office of the Chief Surgeon.

Later in the summer when it was decided in the office of the Chief Surgeon to have reports sent in from separate departments to the director of professional services, a form for such a report was made up in the office of the senior consultant and submitted to the chief surgeon. A large supply of these blank forms was then printed and a number sent to each of the ophthalmic surgeons with the direction that two copies of the report be sent to the director of professional services, with the understanding that one copy would be sent by the latter to the office of the senior consultant in ophthalmology, so that a general idea of the work being done in the various hospitals could be ascertained and a compiled report could be sent to the chief surgeon each month.

MONTHLY REPORT OF OPHTHALMOLOGICAL SERVICE.

Hospital No... Month of......191..

TYPE OF CASES	No.	Remarks
Bed cases admitted to eye service	...	...
Eye cases cared for on other service	...	...
Eye cases seen in consultation, once or twice	...	...
New cases seen in out-patient's department, exclusive of a-b-c	...	...
Old cases seen in out-patient's department, exclusive of a-b-c	...	...
Number of enucleations	...	...

Number of eviscerations ....
Number of cases requiring use of magnet (intraocular) ... ...
Number of cases with magnetic foreign body in eye ....
Number of cases with nonmagnetic foreign body in eye ... ...
Number of intraocular foreign bodies removed with magnet ... ...
Number of gas cases with definite corneal ulceration ....
Number of cases blinded or with loss of useful vision (both eyes) ....
Number of refractions ....
Number of prescriptions for glasses ....
Total number of cases ....
Remarks:

....
Ophthalmic Surgeon.

Instructions.—This report should be completed each month by the Ophthalmic Surgeon of each hospital and forwarded direct to the Director of Professional Services. Two copies must go to Director Prof. Services, GHQ, A. E. F., APO No. 706.

VIII. TRACHOMA SURVEY.

The division of ophthalmology was asked by the medical division of the labor bureau to make a survey of the administrative labor companies in the A. E. F., to determine the amount of trachoma and to suggest methods for its control. These labor companies were scattered over the whole of the A. E. F., from the air fields, close to the front, back to the base ports. This survey was completed in November. The eyelids of 12,641 laborers were turned, 261 cases of trachoma were found and upward of 1,500 cases of suspicious conjunctivitis. Measures were suggested for the handling of this problem.

Practically the whole of this survey was carried out by Lieut.-Col. George S. Derby, with the hearty and active cooperation of the medical division of the labor bureau. (See p. 500.)

A full report of this survey was submitted to the Chief Surgeon.

IX. ARMY OF OCCUPATION.

Major Ralph A. Fenton was nominated as ophthalmic consultant for the Army of Occupation and Lieut.-Col. Nelson M. Black from the office was detailed to advise with him in suggesting a plan for an eye service for this army.

The following suggestions have been submitted to the office and forwarded to the Chief Surgeon:

Lieutenant-Colonel Black suggests: (*a*) that a combined ophthalmologist and otolaryngologist (capable of passing on ordinary ophthalmologic conditions) be attached to each division; (*b*) that one field hospital from each division be selected to take care of minor eye cases; (*c*) that the more serious cases and all refraction work should be sent back to the nearest evacuation hospital; (*d*) that a center be established on the front at Coblenz and one on the line of communications, possibly at Treves, with the best eye equipment available, where the bulk of the eye work will be done and where the two optical units, recently asked for and sent, will be located.

It is possible that when conditions become more settled in the Army of Occupation, certain changes may have to be made in these plans to conform to a changing situation, and to changes in location of evacuation and mobile hospitals.

X. ORGANIZATION OF AN OPHTHALMOLOGIC SERVICE.

Suggestions.—The experience of the division of ophthalmology since it was instituted leads to the following suggestions for the organization of an ophthalmologic service:

On numerous occasions during the past campaign there was a shortage of men capable of doing ophthalmologic work, due to several factors. Ophthalmologists were not attached to all of the early base hospitals which came over, and to none of the evacuation hospitals, but the need of them in the latter was so urgent that the Chief Surgeon, at the suggestion of the senior consultant, cabled the request that a skilled ophthalmic surgeon be attached to all future evacuation hospitals to be sent over. For all the mobile hospitals that were organized in France and the early evacuation hospitals, there were not enough casual ophthalmologists from home at first available. The need for a very considerable number of ophthalmologists in the expeditionary force is, therefore, evident; and it is not probable that the supply of fully capable men will ever reach the demand. Therefore, the available men must be placed where they will do the most good.

At the time the armistice was signed there were places where at least 150 ophthalmologists could be used to advantage in replacement divisions, mobile, evacuation, base and camp hospitals.

1. *Divisions.*—Certain of the divisions serving at the front have had an ophthalmologist on duty and have received the equipment necessary for refractive work, the treatment of disease conditions and for minor operations. Certain other divisions have asked that an ophthalmologist be assigned. If there were forty divisions in France at the close of hostilities, with more to come during the succeeding year, it is easy to see what a drain on the ophthalmologic forces it would be to put a man in each division. No eye surgery should be done in the field hospital. At the most, only minor cases, or mild gassed eyes, should be held there; and these may be treated by the medical officers on duty, following the instructions from the ophthalmic division. If, in an emergency, the advice of an eye surgeon is required, it is always possible to obtain one from the nearest mobile or evacuation hospital. Eye patients from the divisions who need treatment should be sent to the nearest mobile, evacuation or base hospital. Refraction work for the division should be done in the evacuation hospital or a nearby base hospital.

An exception to this is the replacement divisions. To each of these an ophthalmologist should be attached.

2. *Mobile Hospitals.*—An ophthalmologist should be stationed in every mobile hospital, and it has been the aim of the senior consultant in ophthalmology to accomplish this.

At the time of the Argonne campaign, five of the mobile hospitals functioning had men capable of doing the best type of eye surgery.

Mobile hospitals should be thoroly equipped to do eye surgery. They should be provided with the Army eye case of 1917, the auxiliary eye case, an electric ophthalmoscope, condensing lens, an electric flashlight and a large and small eye magnet, which, in these hospitals, can obtain current from the roentgen-ray circuit. While the actual number of eye cases will be small, the availability of skilled eye treatment may make the difference between sight and blindness.

In open warfare the number of eye wounds runs from 2 to 4 per cent. The ophthalmologist is a necessity in the mobile hospital, for experience has shown that only the exceptional general surgeon is sufficiently conversant with eye work. The ordinary débridement of wounds as practiced in war surgery is absolutely contraindicated in wounds of the ocular structures. The retention of all possible tissue in the neighborhood of the eye is necessary for its integrity. Enucleations and eviscerations of the globe are seldom properly done by the general surgeon and packing of the orbit with gauze, so commonly done by them, is absolutely unnecessary and pernicious. The extraction of magnetic intraocular foreign bodies and the decision as to the course of treatment to be pursued in the case of an injured eyeball are matters for the skill of the specialist. These functions have been carried out by the men attached to evacuation and mobile hospitals.

It is fully recognized that there is not sufficient eye work to occupy the whole time of an ophthalmologist in the mobile hospital or even in the evacuation hospital (except in peace time, when there is refraction to be done). He should be and, in many instances, has been placed as the second member of an operating team. All eye cases are referred to this team, and when it is necessary to perform an eye operation the position of the members of the team is reversed.

During all times the ophthalmologist may be and is often assigned to other duties. It is a basic principle that all eye men attached to mobile and evacuation hospitals shall be prepared to undertake these other duties besides their eye work. During periods of stress, however, commanding officers of hospitals should not overload their specialists with so much work that they cannot attend to their special cases.

Mobile hospitals need not be equipped to do refraction.

3. *Evacuation Hospitals.*—What applies to the mobile hospital applies also to the evacuation hospital. This latter unit, however, being of a more permanent character, should be equipped to handle all varieties of eye work. In addition to the equipment necessary to the mobile hospital, the evacuation hospital should have a trial case and necessary charts and a hand perimeter. Refraction for the divisions should be carried out here.

During periods of stress, the ophthalmologist should be assigned as second man on a surgical team, and during peace times he should be able to devote the whole of his time to his eye cases.

Where two or three evacuation hospitals are situated in close proximity, only one need be fitted up to care for refraction work and the eye men attached may pool their outpatient work. Such a condition existed at Evacuation Hospitals 6 and 7 at Souilly for a period in 1918.

At the close of hostilities nearly every evacuation hospital in the field had an ophthalmologist attached, and, with the exception of eye magnets, had a fair, though hardly sufficient, equipment.

A competent ophthalmologist was, for a time, stationed at the principal gas hospital; and plans were made to cover the other gas hospitals from the evacuation hospitals in the neighborhood.

In periods of stress last summer and autumn the ophthalmic consultants from the headquarters at Neufchateau served at evacuation and mobile hospitals, as the supply of ophthalmologists was inadequate.

Optical service for evacuation hospitals has been discussed in the section of optical service.

4. *Base Hospitals.*—Each isolated base hospital should have an ophthalmologist attached, and this has been the case, except for a brief period in a few instances. Each one should also have the complete ophthalmic equipment listed for base hospitals.

The isolated base hospitals have taken care of all varieties of eye cases, except in some instances the magnet cases.

Base Hospitals 15 and 17 and Camp Hospital 27 have each an optical unit. In other instances prescriptions for glasses have been sent to the nearest unit, or to Paris.

Where the amount of work justified it in isolated base hospitals, the eye service was separated from the ear, nose and throat. Where the work was light, the two services have been united.

5. *Base Hospital Centers.*—Where base hospitals are close together, in groups of two or more, one of the hospitals should be selected as a center to receive all the eye cases sent to the group. All of the ophthalmic surgeons necessary to such a central clinic should be provided from the surrounding hospitals. Two or three ophthalmic surgeons can easily take care of all the ophthalmic work of five or six hospitals so that a number of hospitals in the group need have no ophthalmic surgeon. Whatever consultation eye work is necessary can be handled by calling in one of the men from the central eye clinic. Where this plan has been adopted, and has been established long enough to be put on a firm working basis, it has proved of great value. It saves special equipment and personnel. It must be obvious to anyone that a single good sized eye clinic, similar in design to the one mentioned and appended in the body of this report, would be far better, for instance, in a group of ten hospitals than to have ten separate sets of clinical rooms. Each such center should have one of the most competent ophthalmologists obtainable in charge of the work, and he can act as consultant for the surrounding area.

Such centers were established in Base Hospital 46 for the Bazoilles area and in Base Hospital 36 for the Vittel and Contrexeville areas, and progress was being made toward establishing centers at Allerey, Mesves and Mars. Additional centers would have been established at Paris and Beaune, and in other areas, when the need arose.

Dec. 1, 1918, the division of ophthalmology had eighty-six ophthalmologists listed as serving in base hospitals.

6. *Camp Hospitals.*—The amount of eye service required in camp hospitals varies enormously according to the function of the hospitals. Camp Hospital 26, which served the First depot division for several months, ran in the neighborhood of 1,000 new eye cases a month, occasionally more. At this camp hospital the eye, ear, nose and throat work constituted a single service and there was enough work for three and sometimes four men. There was no base hospital close to Camp Hospital 26.

At some camp hospitals there was practically no eye work done and what little developed was transferred to the nearest base hospital.

The policy of the division was to join with the ear, nose and throat service and place a combined eye, ear, nose and throat specialist at isolated camp hospitals. Camp hospitals in the neighborhood of base hospitals transfer their eye work to the base hospitals.

Dec. 1, 1918, this division had listed twenty-eight men doing eye work in the camp hospitals. Doubtless there were a number more as all the camp hospitals had not been visited.

XI. ROUTING OF EYE CASES.

The centralization of eye cases near the front seems to be feasible to a certain extent and is highly desirable. Such an experiment was carried out in the early part of the Argonne campaign, with a certain degree of success in spite of the fact that the hospital chosen to receive these cases (Mobile Hospital 6) was in an inaccessible location and a long distance back of the front. As the line moved forward, it became practically impossible to route cases there on account of the great distance and its inaccessibility.

While this hospital was in operation, however, a very considerable number of eye injuries were treated there. An attempt was made to send to this hospital all cases with a head bandage.

From the ophthalmologic standpoint the establishment of such a hospital simplifies the work of the division of ophthalmology and increases the efficiency of the service.

A thoroly experienced ophthalmologist may be spared for such a position. Special equipment may be placed at his disposal. Moreover, such a hospital is very useful for training less experienced men in the handling of eye conditions seen in war. Eye cases, therefore, when possible, should be routed to special front line hospitals.

When eye cases are routed thru to the base hospitals they should bear some distinguishing mark in order that they may reach the eye center in the area to which they are to go. To accomplish this purpose ordinary baggage tags, with a large EYE printed on them, were supplied to the front line hospitals and ophthalmologists were instructed to tag their cases before evacuating them. This system gave promise of being of considerable help in properly distributing cases.

XII. CENTRAL EYE HOSPITAL.

After the organization of the ophthalmologic service a pressing need was felt for a base hospital that would have a large number of beds available for eye cases, where special equipment would be installed and which would be manned by a staff of experienced ophthalmologists.

Base Hospital 115, equipped especially for head cases, ear, nose and throat, facio-maxillary and eye cases, was designated as this special hospital.

A beginning had been made in routing to this hospital eye cases needing special observation and study and cases requiring extensive plastic reconstruction work. At this hospital were artists capable of making colored plates of especially interesting cases and a specially trained pathologist was also to be available. It was planned to send all eye pathologic specimens to this hospital for study and record.

XIII. TEACHING AND OBSERVATION.

It has been fully realized that war ophthalmology presents certain special features, a knowledge of which is of great importance for the eye specialist if our wounded men are to receive the treatment which they deserve. Both the senior consultant and the assistant consultant had had a considerable period of service with the B. E. F. before serving with the A. E. F., and since then have had opportunities to see some of the work done by the French. The exigencies of the situation in France made it impossible to give many ophthalmologists opportunities for observation during the active period. Three men were sent for a period of time to observe in the principal British eye clinic, in France, and several more had an opportunity to see French work in various Paris hospitals. The others were instructed, as far as possible, by personal visits by the consultants and by means of circulars.

Two other men had an opportunity to see some of the British and French work before the senior consultant was appointed.

All of these men occupied important positions and their opportunities for observation in allied clinics were of considerable advantage to them.

Base Hospital 115 was also to have served as the eye teaching center for the A. E. F., where men could be sent for instruction, especially during the less active winter months. It was also intended that the men sent there for instruction should be classified as to their qualifications as ophthalmic surgeons. This was done to a certain extent with casuals assigned to this hospital. Had the war continued, Special Base Hospital 115, under the able management of Lieut.-Col. E. C. Ellett, who is so well known to all ophthalmologists in America, would have developed a very large and important eye center for instruction and qualification of Army ophthalmologists.

XIV. SUGGESTIONS FOR IMPROVING EYE SERVICE.

1. *Refraction.*—A great deal of unnecessary refraction work overseas could be avoided if a more careful ocular examination were made at home, a more careful record made of vision and refraction, and if a permanent record were to accompany the soldier.

The question of a permanent vision and refraction record was taken up by this office very early and a gummed record slip, similar to that used by the B. E. F., was printed and furnished with each pair of glasses.

The best way to preserve this record is to paste it inside the cover of the pay book in the case of enlisted personnel, while with the officers and others, it may be pasted inside the glasses case, or better, carried with the personal papers.

If this slip be fully made out a permanent record is preserved, and replacement glasses may be ordered without further examination.

2. *Equipment.*—(1) Army eye instrument case. Certain changes can be made in the army eye instrument case, which would add to its usefulness:

a. When the present supply is exhausted it would be wise to combine all necessary instruments in one case. Until that can be done changes in the contents of the 1917 case should be made, to make it more independent of the auxiliary case.

b. The eye speculum now in the 1917 case might be replaced by a nonmagnetic one of a different type.

c. Nonmagnetic forceps should be provided.

d. A pair of more suitable enucleation scissors should be provided.

(2) Auxiliary eye case. Certain changes should also be made in the auxiliary eye case, which would add to its usefulness:

a. The present cautery set should be done away with; and a Todd cautery, or other cautery of that type, should be substituted.

b. A Meller's speculum for excision of the lacrimal sac should be added.

c. In an Army eye case a small supply of necessary special drugs in tabloid form should be placed. These should include atropin, homatropin, eserin, cocain and fluorescein. These would take up very little space.

(3) Chest of eye equipment for base hospitals. It might be desirable to have standard chests capable of holding complete eye equipment for a base hospital. Such a chest should contain the following list:

Army eye case, 1917—with changes as noted.

Auxiliary eye case—with changes as noted.

1 flash light.
2 De Zeng electric ophthalmoscopes.
1 hand perimeter, with 6 dozen charts.
1 standard perimeter (for base hospitals only).
1 Zeiss, or Bausch and Lomb, binocular corneal loupe.
2 irrigators (New York Eye and Ear Infirmary type).
12 soft rubber ear syringes.
36 glass spheres (18, 20 and 22 mm.), 12 each.
1 set Jennings color vision test.
1 instrument rack.
1 complete set of test charts for distant and near vision.
4 different arrangements of letters.
1 illiterate chart.
1 reversed type chart.
1 chart beginning with a 20/100 letter.
3 frosted bulbs for retinoscopy and ophthalmoscopy.

1 extensible wall bracket for ophthalmoscope light.

12 prescription pads with carbon copy.
1 complete set of directions for vision testing and record keeping should be in every instrument case and trial lens set.

1 copy of Manual 3 and one copy of Manual of Ophthalmology (Surgeon General's Office).

2 eye magnets, one large and one small (Lancaster type), with electric foot switch and necessary connections should be furnished, but packed in separate box, on account of their weight.

3. *Personnel.*—All ophthalmologists should be tried out and carefully graded in the United States before being sent on foreign duty; and their records should be sent over with them, or in advance of them.

The following is the station list of the ophthalmologists with the A. E. F., Dec. 1, 1918:

Headquarters Medical and Surgical Consultants, A. E. F.—Neufchateau.

Lieut.-Col Allen Greenwood (Senior Consultant).

Lieut.-Col. George S. Derby (Assistant Consultant).

Lieut.-Col. Nelson M. Black (Consultant attached to Headquarters, Medical and Surgical Consultants).

Army of Occupation.

Major Ralph A. Fenton (Consultant).

Tactical Divisions.

5th. Capt. A. R. Kidd.
77th. Lieut. Reddy.
83rd. Lieut. A. S. Rochester

Mobile Hospitals.

4. Capt Lawrence Post (Ophthalmologic on surgical service).
5. Major J. B. Corser.
39. Capt. A. H. Little.

Evacuation Hospitals.

1. Major G. I. Hogue (Consultant, Toul Area).
2. Capt. Ernest Rau.
3. Lieut. G. A. Peacock.
4. Lieut. C. M. Buckner.
5. Capt. Harry V. Judge.
6. Capt. H. E. Keely.
7. Lieut. R. E. Riemers.
8. Capt. E. G. Foote.
10. Lieut. Moncrieff.
    Capt. S. I. Ebers.
11. Capt. Andrew Hunter.
12. Lieut. A. I. Arenson.
13. Lieut. J. J. Zimmerman.
14. Lieut. H. H. Ainsworth.
15. Lieut. J. M. Severson.
16. Lieut. C. C. Cowan.

Base Hospitals.

1. Capt. W. W. Weeks.
   Lieut. H. L. Pelle.
2. Capt. L. W. Jessamen.
3. Lieut. Cyril Barnert.
6. Major Alex. Quackenboss (Consultant, Base Section 2).
   Capt. Ralph Hatch.
7. Capt. A. B. Connor.
8. Capt. Roy Connor (Consultant, Savenay area).
   Lieut. Fuller.
9. Lieut. Roy Parkinson.
10. Lieut. J. H. Roth.
12. Major Adam Sherman.
13. Lieut. Andrew Carr.
14. Capt. M. H. Powers.
    Lieut. E. B. Fowler.

15. Capt. G. H. Grout.
Lieut. R. E. Sullivan.
17. Major D. A. Campbell.
18. Capt. Lloyd B. Whitham (Consultant, Bazoilles area).
20. Capt. Claude McKee.
21. Lieut. C. R. Farham.
22. Major Herbert Walker.
Capt. H. B. Orton.
24. Capt. Charles A. Bahn (Consultant, Limoges area).
25. Major Clarence King (Consultant, Aleray area).
26. Lieut. S. T. Forsythe.
27. Major S. Smith.
28. Capt. J. W. Kimberlin.
29. Capt. W. C. Finnoff.
30. Capt. N. P. Wood.
31. Capt. J. D. Washburn.
32. Capt. W. H. Post.
34. Lieut R. J. Sprowl.
35. Lieut. S. H. Jesburg.
36. Major J. M. Patton (Consultant, Vittel-Contrexeville areas).
37. Major E. P. Odeneal.
Lieut. H. R. Miller.
38. Capt. J. R. Forst (Consultant, Nantes area).
40. Capt. R. Rockhart.
41. Capt. J. W. Burke.
Capt. Frederick Falk.
43. Capt. C. L. Kaucher.
Lieut. M. S. Equen.
44. Lieut. W. D. Rowland.
45. Capt. R. Wright.
46. Lieut. Chas. E. West.
47. Lieut. H. A. Fletcher.
48. Captain L. E. Hetrick.
50. Capt. A. E. Mattice.
53. Capt. O. P. Bennett.
55. Capt. John F. Edwards.
56. Capt. Walter F. Macklin.
57. Capt. J. Stanford.
58. Major George W. Jean (Consultant, Rimaucourt Center).
60. Capt. J. W. Earel.
61. Capt. Robert H. Fowler.
Lieut. George H. Lang.
62. Lieut. J. F. Herbert.
65. Capt. William A. Cook.
66. Lieut. R. S. Beam.
67. Lieut. M. W. Blair.
69. Capt. Thomas H. Curtin.
Capt. H. B. Lemere (Mesves Hospital Center).
Capt. B. F. Baer, Jr. (Consultant, Mars Hospital Center).
70. Lieut. Ralph L. Daniels.
76. Capt. Alfred W. Haskell.
77. Capt. Henry Stanbery.
80. Lieut. Frank C. Leavitt.
81. Capt. C. E. Rayburn.
82. Capt. George Mytinger
84. Capt. B. H. Jenne.
88. Capt. C. E. Connor.
101. Capt. Robert Beattie.
105. Capt. A. E. Ibersoff.
114. Capt. C. N. Sneed.
115. Lieut.-Col. E. C. Ellett (Consultant, Vichy Hospital Com. area).
Capt. L. M. Francis (In charge of Ophth.).
Capt. C. A. Burkholder.
Capt. Carl Fisher.
Capt. H. B. Searcy.
Lieut. Grady E. Clay.
Lieut. G. A. Poux.
Capt. Alan C. Woods.
116. Lieut. H. B. Chandler.
202. Capt. A. D. McCornachie.
204. Lieut. F. A. Millet.

American Red Cross Military Hospitals

1. Capt. F. W. Shine (Consultant, Paris area).
Capt. A. G. Fewell.
2. Lieut. W. B. Doherty.
3. Lieut. E. D. Loughran.
4. Capt. Earl B. Brooks.
5. Lieut. Lyman A. Copps.

Camp Hospitals

3. Lieut. Nicholas Edrington.
4. Capt. F. G. Sprowl.
Capt. E. R. Sibley.
7. Capt. George W. Boot.
8. Capt. Snyder Maiden.
9. Capt. F. B. Harding.
12. Lieut. J. F. Herbert.
13. Capt. E. H. Vine.
14. Capt. F. P. Herrod.
15. Capt. Martin Crook.
19. Capt. A. G. Mathewson.
26. Major C. F. Jump.
Lieut. Cecil Stockard.
27. Capt. E. H. Cooper.
99. Capt. E. E. Straw.
31. Capt. J. H. Shaw.
33. Lieut. M. J. Weiss.
34. Lieut. E. R. Cotham.
36. Lieut. W. Bishop.
37. Lieut. Cady.

38. Lieut. E. F. Stroud.
40. Capt. R. J. Bullard.
42. Capt. E. L. Titus.
48. Capt. Ira J. Magee.
50. Capt. Frank I. Powers.
68. Lieut. Porter Hopkins.

Chief Surgeon's Office, Base Section 5.
Capt. E. A. Looper ....

Attending Surgeon's Office, Paris.
Capt. W. D. McKenna ....

Attending Surgeon's Office, Army Schools.
Capt. John B. Smyser ....

Chief Surgeon's Office, Base Section 3.
Major William T. Shoemaker..
(Consultant.)

PENETRATING AND PERFORATING WOUNDS OF THE EYEBALL WITH DIAGNOSIS AND TREATMENT OF RETAINED FOREIGN BODIES.

William T. Shoemaker, M. D.

PHILADELPHIA.

This paper gives a general survey of the character of the wounds of the eyeball, encountered by the ophthalmologists of the American Expeditionary Forces, and discusses the treatment judged most appropriate for each class of cases. It was read before the American Ophthalmological Society, June 14th, 1919.

Wounds penetrating or perforating the eyeball as seen during the war, present a number of interesting lines for discussion. If the eyeball is sufficiently destroyed from rupture, removal—incomplete or complete—is necessary; and if vision is totally lost from hemorrhage or intraocular damage, removal may be advisable. In these cases, the only question is the advantage or disadvantage of one of the several methods, and the selection of the best method for that particular case. If the eyeball is not destroyed, but contains a foreign body, discussion might be endless upon the various procedures to be practiced. First, a determination of the character of the F. B. whether magnetic or nonmagnetic. Second, its size and location as shown by the X-Ray. Third, if magnetic, the best way to attack it, whether by the anterior or the posterior route; the best sort of magnet, and the best technic. And fourth, if nonmagnetic and otherwise inaccessible, shall it be allowed to remain, or shall the eyeball be removed; in other words, judgment on the dangers of sympathetic opthalmia. The totally destroyed eyeball—and the majority of them with us were in this class—has been well described by Col. Lister and others. It presents little interest, and offers but little opportunity for anything but ordinary skill and judgment. Such eyeballs were often primarily eviscerated, and the accompanying conditions were mostly compounded comminuted fracture of the orbital and other bones of the face and skull, laceration and destruction of the the lids, conjunctiva, etc. Brain substance was frequently lost thru a fracture of the orbital roof; and frequently the ethmoidal sinuses, the antrum, and the orbit, were thrown into a common cavity. Swelling and infiltration were intense, and the only practical operation was a cleanup operation. The foreign body, generally near at hand, was sometimes far removed from the domain of ophthalmic surgery. For example, in one case, a large piece of shrapnel had passed from before, backward, completely through the eyeball and orbit into the brain, and rested there beneath the cortex in the temporal lobe, just in advance of the ear. By a partial exenteration of the orbit and the aid of an ordinary large nail as a tip introduced through the wound of entrance, I was able to recover the F. B. with the hand magnet. The patient made a good primary recovery and went to Blighty, apparently little the worse for the wear. What has happened since, I do not know. When possible, I enucleated completely what was left of the badly ruptured eyeball, with the feeling that recovery was more quickly reached in this way than by allowing the eviscerated sclera, or any part of it, to remain. Col. Lister favored the retention of a button of sclera next the nerve, to avoid opening the nerve sheath. While fatal meningitis and sinus thrombosis following enucleation for panophthalmitis is possible, and theoretically a danger, it must be an exceedingly rare occurrence.

Noyes[1] concludes that "while a small risk of life is incurred by enucleation, about 1 in 4,000, the supposed increase of risk by the existence of suppurative panophthalmitis is not so far justified by the facts, as to bar its performance under these conditions. Neither when proper indications arise, need we on this account hesitate to do the operation.

Kontrowitsch reviews the literature to 1912, and concludes that on the whole, enucleation is a fairly safe procedure. Darrieux holds that in traumatic panophthalmitis, enucleation is the operation of choice, while in other forms of panophthalmitis, that operation offers no greater danger than any other operative procedure.

I have seen one case of suppurative meningitis following enucleation for panophthalmitis. That was 19 years ago. And more recently I had a case of beginning sympathetic ophthalmia, following enucleation in which a button of sclera had been allowed to remain. The condition promptly disappeared when the sclera was removed. To this case, however, belongs an explanation. The eyeball had been imperfectly enucleated, and the operator had cut thru the sclera of a collapsed eyeball instead of thru the nerve. Naturally, the stump contained portions of retina and choroid, which may well account for the subsequent trouble. It emphasizes, however, the importance of thoroly disposing of all but sclera when we eviscerate. In my opinion, complete enucleation in these cases is the preferable operation, irrespective of the septic or nonseptic condition of the eyeball. It is important to conserve as much of the lids and conjunctiva as possible, as the end results of such extensive palpebral, orbital, and bulbar injuries as occurred in the War, are often most disappointing. Regarding the shattered fragments of bone, it does not require much of an attachment for them to be usefully retained. Therefore, only the very loose and apparently totally detached pieces should be removed. In the treatment of these crude traumatisms, I found dichloramine T in eucalyptol of the greatest value. It was used very freely, gauze soaked in it being loosely packed into all cavities and recesses, and all parts of the wound and its surroundings sprayed with it. Return of the tissue toward the normal was surprisingly rapid and in no cases were bad effects noted. Great benefit, I believe, resulted from its free use.

The intraocular foreign bodies demand removal, when such is practical, as soon after the injury as possible, and with as little additional damage to the eyeball as necessary. Removal by forceps from the vitreous can scarcely be considered as practical, because, when successful, it is more a question of luck than skill. If large enough to get, we might as well take the eyeball. The metalic substances encountered in these injuries were iron, steel, copper, lead, tin, brass, nickel, aluminum, mixed metals, and I presume others. Then, of course, eyes were injured by stone, gravel, glass, china, wood, or anything in the neighborhood. While but two of these substances are magnetic, I would say that fully 50% or more of my cases of intraocular foreign bodies were in this class. As to this point, there is a wide difference of opinion, based on the personal experience of different workers, and the true percentage value of the magnet can only be reached later, by a careful study of innumerable records. In this connection, mention is made of a remarkable statement from L. Vernon Cargill (1915) that he found the electromagnet of no use in either the South African or the present war. He had but one case of magnetic foreign body.[2]

As is well known, the eyeball was more tolerant to metals which became more or less sterile in transit, than to foreign bodies secondarily projected from the ground or surroundings. Injuries from stone and gravel, sand, etc., were as usual particularly disastrous.

The X-Ray with a certain amount of localization was essential. I say certain amount, because, if the F. B. could be definitely located within the eyeball, its mathematically exact position within the eyeball, to my mind, made little difference in many cases. This is particularly true of foreign bodies in the vitreous, and according to Whitehead, 75% of all intraocular foreign bodies are in the vitreous. Such a diagnosis was in most cases sufficient, but in some cases, a more exact localization was very desirable. The British hospitals were wonderfully equipped in the eye service, thanks to Col. Lister, and excellent localizations by the Makensie-Davidson method could always be obtained without too much trouble. Furthermore, a giant magnet, mounted in a motor ambulance, was always anxious to travel anywhere in the area if needed. No. 16 General Hospital, B. E. F., staffed by Pennsylvania Base Hospital 10, was weak on X-Ray localization, but it had a very satisfactory hand magnet that could recognize iron or steel if given a chance. The practical way of determining whether or not the F. B. was magnetic, was cautiously to try the hand magnet near or against the eyeball. This can be safely done if the eyeball is strongly rotated and the magnet first approached near the equator, and this zone tried out in all portions. If magnetic, the patient will unerringly feel a slight pull or at least a sensation. This is true of even very small foreign bodies, and for obvious reasons is a much safer procedure with a small than with a giant magnet. If the eyeball contained a visible open wound of entrance, immediate application of the magnet tip in the wound, irrespective of its position, was all that was necessary.

In my experience intraocular foreign bodies from war injuries are usually larger than those ordinarily found in civil practice due to industrial accidents. Hemorrhage and destruction are frequently overwhelming, and removal of the foreign body with retention of a blind eyeball, is often all that can be expected.

Regarding the size of war foreign bodies, the statistics of Morax and Moreau[3] are interesting. Sizes were arbitrarily divided into three classes: small, weighing less than .25-.30 gram; medium, .30-5 gram; and large, weighing more than 5 gram. Of a total of 486 injuries, 54% were by small fragments, that is, fragments weighing less than .30 gram.

The more important cases are those of small F. B. with a minute or closed wound of entrance, and with comparatively little hemorrhage or destruction. The foreign body has been localized and is known to be magnetic. It is in the vitreous, has passed through the sclera, and the anterior segment of the eyeball is uninjured. Will you remove it by the anterior route or by the posterior route? Will you use a giant magnet by the Haab method, or a good hand magnet; or a giant magnet used as a hand magnet? It is only fair to say that my experience has been almost entirely with the small magnets, notably, the Parker and the Sweet, but I feel that either of these magnets, if properly used, can be relied upon to get almost any free magnetic foreign body within the eyeball. Of course, in war work, the foreign bodies were practically all free from surrounding exudate. Nor is the actual strength or pull of a magnet alone the index of its efficiency. As shown by Lancaster[4], the tip is an important factor. He found that a short conical tip gave the best results. Sweet found, in testing the relative strength of the Haab, the Hirschberg, and his own magnet, that at 2 mm. distance, his own was superior, at 5 mm., the Haab was stronger, but not markedly so; while at 10 mm. or more, the large magnets were decidedly superior. There are other mysterious qualities of magnets which if considered should induce the surgeon in a given case to think more of the foreign body, its size, shape, and location, and the damage already done to the eyeball, rather than of the magnet alone. In other words, it is a mistake to feel that either the large or the small magnet is always the best in every case. The facility with which the small magnet can be handled, and the greater extent of the eyeball over which its tip can be applied, are distinct advantages, and might in certain cases outweigh the advantage of greater power. It is perfectly true that those who habitually use the small magnet often wish for more power. Then is the time to call on the giant, but I would still stick to the posterior route for all bodies in the vitreous entering through the sclera. If the anterior segment of the eyeball is intact and uninjured, I certainly would not injure it by dragging a foreign body from the vitreous into it, and then further injure it by taking the foreign body from it. We all know how the F. B. is supposed to come into the anterior chamber, but we also know that sometimes it is clumsy and spoils a perfectly good lens or iris in its transit.

There would seem to be little danger in a sclerotomy, and while increased or serious hemorrhage might result, it is certainly not to be greatly feared. A posterior sclerotomy, when indicated, can be done with reasonable safety.

Finally, what is to be done with eyes containing nonmagnetic bodies in inaccessible positions, or foreign bodies we have failed to remove? The universal teaching a few years ago made the removal of such eyes obligatory. Not to do it was then malpractice. To do it now, per se, is practice equally bad. It all hinges on the question of sympathetic ophthalmia, and I know of no disease that has so failed to make good during the war, with such unlimited opportunity, as has sympathetic opthalmia due to the retention of a foreign body within the eyeball.

Parson's summary of the situation is very illuminating, and helps a great deal in deciding the proper disposal of these cases. The best theory for the disease, he thinks, is the transmission of an unidentified, specific organism by the blood steam, the socalled metastatic theory. The site and nature of the wound are potent factors, and not the mere retention of the foreign body. A sterile foreign body does not itself cause sympathetic opthalmia, but secondary infection may do so. Any wound involving incarceration of the ciliary body or capsule is dangerous. He does not think that the mere retention of a sterile foreign body, whatever its nature, is of any importance at all so far as sympathetic opthalmia is concerned.

Collins has also learned from experience that an aseptic foreign body implanted in the eye and chemically inert, causes no disturbance apart from the wound of entry. When sympathetic ophthalmia arises, it results from the nature or infection of the wound.

These statements from such authorities allay much of the former anxiety over cases in which we have failed to recover foreign bodies from the eye, and we must, as they indicate, pay more attention to the nature and condition of the wound of entrance.

In the discussion before the R. O. S. of G. B. where these statements were made, the question was asked, by what means one could know when sympathetic ophthalmia was likely to occur. Mr. Arnold Lawson gave in reply four very important factors always to be kept in mind.

1. Prolonged and intractable cyclitis or general uveitis, which goes on for week after week in spite of treatment.
2. The gradual supervention of an increasing lowering of the intraocular tension, which is always accompanied by progressive failure of sight.
3. Continual photophobia and sympathetic neurosis affecting the other eye.
4. The condition of the blood count.

Hypotony he regards as perhaps the most important danger sign, and lays great stress on the importance of a considerable increase in the mononuclear cells in the blood (S. H. Browning).

T. R. Gifford believes mononucleosis to be a reaction of the body to a chronic inflammatory process in the eye of any kind, and concludes that its presence does not specifically indicate the presence or the imminence of Sympathetic Ophthalmia.

The danger of the three other conditions, I think is well established, and in the presence of any one of them the indication for enucleation is clear. Nor should we forget that enucleation is only an absolute preventive if done before the sympathetic process, whatever it might be, is created. While there is a great tendency to refrain from destructive surgery, we might profit by the experience of the general surgeon in his treatment of malignant disease, and if an eye is blind or practically so, materially reduce its supposed valuation.

REFERENCES.

1. Noyes. Textbook, p. 546.
2. L. Vernon Cargill. T. O. S. U. K., 1915.
3. Morax and Moreau. B. J. O., Feb., 1917.

OCULAR COMPLICATIONS OF PERIPHERAL EPILEPSY

J. M. Penichet, M. D.

HAVANA, CUBA.

This paper gives the relative frequency of ocular symptoms with epilepsy, and reports cases in which seizures were attended with intraocular hemorrhage and loss of lid movements.

Up to the present, not even among the number of epileptics which I have under my care at the Government Hospital for the Insane, have I been able to find two cases as curious as the ones that I am about to describe, chosen from my private practice.

But before doing so, let us look over the symptoms of ocular complications in epilepsy. For the sake of clearness I have made the following table.

Symptoms Before the Seizure.
I. Purely Subjective.
a. Visual sensations of light.
b. Visual sensations of color.
c. Visual sensations of flames or flashes.

Symptoms During the Seizure.
II. Purely Objective.
a. Forced deviations of the eyes.
b. Pupillary changes. Contractions or Dilatations.
c. Pallor or hyperemia of the disc.
d. Vessels—contracted or dilated.

Symptoms After the Seizure.
III. Subjective and Objective.
a. Strabismus, nystagmus, diplopia.
b. Lowered visual acuity.
c. Lag in perception.
d. Transient concentric contractions of visual fields.
e. Subconjunctival ecchymosis.

These symptoms are not all present in every given attack of epilepsy. As a rule only a few can be detected. Ball[1] claims that the subjective, the auras, are the more frequent. Rodiet, Pansier and Cans[2] find the permanent disturbances to be: pallor of the optic disc and retina, probably anemic, passive venous congestion of the fundus with pale disc; often intense blackish pigmentation of the retina and choroid; irregular contraction of the visual fields, in cases of long attack; optic neuritis or advanced gray atrophy. At the close of an attack there is likely to be corneal anesthesia and dilated pupils. Rodiet and Bricka[3] report their observations on 2 cases of Jacksonian epilepsy, one showing optic atrophy due to meningitis and the other[4], choked disc due to gumma.

The following table shows the results of my observations on 41 cases of inmates suffering from epilepsy and the relative ocular complications found.

Years	1914	1915	1916	1917	1918	Total
Number of Cases	5	7	6	11	12	41
Subjective symptoms	4	5	4	8	7	28
Deviations of eyes	2	3	3	4	6	18
Pupillary changes	3	5	4	7	7	26
Fundus changes	1	1	2	3	2	9
Muscular changes	1	1	2	1	1	6
Visual changes	2	3	3	4	5	17
Field of vision	1	1	2	3	2	9
Ecchymosis of conjunctiva	0	1	0	1	1	3

As will be seen more than one-half of the cases complained of visual sensations commonly of light. Next in order, the pupil, reacted by contraction or dilatation in more than one-half of the cases, also. Deviations of eyes were not uncommon, 18 out of 41. Vision was disturbed in 17 cases. Nearly all of these cases were unable to read better than 20/200 for a period lasting from one to seven days after the seizure. Normal vision was gradually recovered in every case. Errors of refraction were present in 13 cases.

7 Simple hypermetropic astigmatism.
3 Simple myopia.
3 Mixed astigmatism.

Out of the remaining 28, two cases were presbyopic; seven were slightly hypermetropic in one eye; one had a complete leukoma of traumatic origin, and the rest were normal.

Generally the fundus changes were, hyperemia of the disc during the first two or three days following the attacks, and pallor, remaining until recovery. The vessels behaved unsteadily. In only one case was I able to examine the fundus during the fit. I had, however, great difficulty in doing so, and the results could not be taken into consideration.

Visual contractions of the field took place in 9 cases. As a rule the contractions were concentric, but irregular in outline and of a transitory character.

Traumatic sequels were rare. Only 3 cases of ecchymosis were recorded. There may be a reason for this. These patients are always under surveillance; and as soon as they express the probability of the coming of a seizure, they are taken to safety and strictly watched. This is not the case with epileptics out of hospital or colony control. Their fits may overtake them at any place, and they usually fall to the ground, injuring themselves, until they are carried to the nearest emergency clinic.

Much has been said and a great deal of time has been devoted to the study of ocular influence upon epilepsy.

Hubbell[5] made a study of the relation of socalled ophthalmic migraine to epilepsy. After all his experiments he was not able to prove a real pathologic kinship.

Hodskins and Moore[6] report the results of keeping 88 epileptics completely under the influence of atropin for one month, and comparing the average of seizures during that month with those of the four months preceding and the month following, when not under a cycloplegic. The average for the maximum month was 19.6, for the minimum month 6.1, for an average month 13.2, and for the month under atropin 12.6 per patient. They "firmly believe that the role played by ocular defects in the causation of epilepsy is a very modest one.[7]

Kinderman[8] reports a case of epilepsy caused by the retention of a piece of the optic nerve and choroid in an orbital cavity from which the eye had been removed. After these structures were excised the patient recovered. The irritation of a retained piece of retina, could, according to Kinderman, originate the epileptic attacks, thus resembling peripheral epilepsy.

Neeper, Gould, Bennet, Ranney and Stevens have all made experiments on patients suffering from epilepsy and having refractive errors. They could not prove that ocular defects could initiate or by their presence aggravate epileptic seizures. Even the correction of the refractive errors did not play an important role in the results of the combined treatment. Such has been my personal experience.

CASE 1. R. H., 55 years of age, White, single, a lawyer and notary public. Two years ago he was referred to me by his family physician after an attack of epilepsy. Since then I have seen him five times.

The family and early history of this case are very obscure.

He has been examined by different specialists and the reports of their examinations prove that the brain and nervous system are the only centers really affected.

All laboratory findings are negative. The urine shows a tendency to low specific gravity.

A number of radiographs were taken with negative results.

PECULIARITIES OF THIS CASE.—Apart from a few subjective sensations of light, before the attacks, and a concentric irregular contraction of the visual fields, after the attacks, this case is interesting because there has always been present, after every fit, a profuse hemorrhage into the anterior chamber of both eyes, accompanied by a total subconjunctival ecchymosis.

This condition usually lasts from twenty to thirty days; when it completely disappears, leaving no trace of the profuse flow of blood. The concentric contraction of the field can be detected for a few days after. This also completely disappears. The eyes recover, and become normal in every respect between the attacks.

TREATMENT.—Atropin and dionin, local applications of heat, leeches to the temples, and purgatives. Protection from light, a special diet, and rest were advised.

CASE 2. Mrs. X. X. 59 years of age, white, married.

Family history. Father and mother died of old age.

Personal history. Measles and intestinal disturbances of childhood.

Present condition. The patient suffers from gastro-intestinal irritation, liver and kidney troubles (hepatitis and a slight albuminuria). She is alcoholic and a heavy smoker. She suffers from periodic attacks of peripheral epilepsy.

Laboratory findings as to syphilis, tuberculosis, lepra, etc., are negative.

Radiographs only show an area of induration of the skull over the right temporal region.

I have seen her three times after the attacks of epilepsy and there has always been present a paresis of the orbicularis, with ptosis of the lower lid and complete anesthesia of the skin over the inferior palpebral region and zygoma. This condition lasts for a period of twenty to thirty days and gradually disappears, leaving no trace of the disturbance.

Treatment included massage, electrical stimulation and general care of the nervous manifestation.

BIBLIOGRAPHY.

1. Ball. Modern Ophthalmology, p. 789.
2. Rodiet, Pansier and Cans. Rec. d'Ophtal., March, April, 1908.
3. Rodiet and Bricka. Rec. d'Ophtal., September, 1908.
4. American Encyclopedia of Ophthalmology, Vol. VI, p. 4490.
5. Hubbell. Trans. Sec. on Ophth., A. M. A., 1908.
6. Hodskins and Moore. Jour. Ophthal and Oto-Laryngol., May, 1908.
7. American Encyclopedia of Ophthalmology, p. 4490.
8. Kinderman. Klin. Monatsbl. f. Augenh., March 1909, p. 333.

AN INFECTIOUS GRANULOMA OF THE LACRIMAL GLAND.

David W. Wells, M. D., F. A. C. S.

BOSTON

This is the report of a case, suspected of malignancy; but in which the excised tumor proved to be a granuloma.

The patient was referred to the writer April 10, 1916, by Dr. F. L. McIntosh. Professional woman, aet. 53, of full habit. Left upper lid slightly edematous, palpebral fissure narrow, and upward excursion of lid somewhat limited but motion of the globe good in all directions. Palpation revealed hard mass in outer roof of orbit, region of lacrimal gland (not adherent to orbit.) Patient discovered it a few weeks previous with finger, no pain, but tender to touch.

Refraction Right — 2.50 ⌢ — .50 C. 105° V = .8.

Refraction Left — 2.50 ⌢ — 1.50 C. 25° V = .8. Was wearing o. u. —2.25.

No fundus lesion. Skiagraph showed well marked shadow extending into orbit about 1 cm. Urinalysis negative. Blood pressure maximum 160, minimum 100. No other glandular involvement detected. Wasserman reaction negative. Von Pirquet mildly positive.

Family and personal history: Typhoid aged 40. Diptheria at 45 with myocarditis. Menopause at 50. Father died at 48 of "stomach trouble"; was a professor. Mother died at 72 of successive shocks. No tuberculosis in immediate family. Paternal uncle died of miliary tuberculosis following exposure in Southern prison during the Civil War. Paternal aunt died of miliary tuberculosis aged 26. Patient is the oldest of eight children, four of whom died in infancy. Mother was ninteen when married and had eight children in 10 years. At school, patient was bright but not brilliant, powerful will and abnormally studious and persevering. When 18 years old father died, assumed responsibility of family, whom she supported by becoming bookkeeper and confidential cashier in large business house. At same time earned college degree in absentia, and managed two other business affairs, making great financial success for 25 years. Then came financial loss, with tremendous nervous strain in settlement of affairs. Studied abroad and took degrees in two Eastern colleges.. Professor in a Woman's College. Patient in good health until present illness. Nervous breakdown following period of depression after mother's death March 1916, one month before first seen by writer. Is very apprehensive and melancholic.

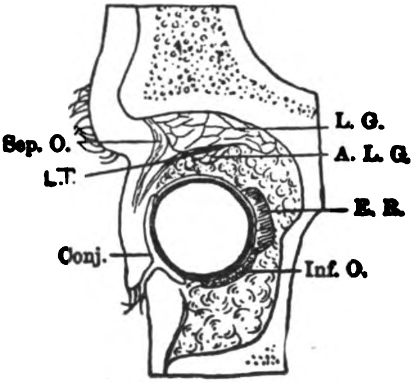


Fig. 1. L. G., lacrimal gland; A. L. G., accessory gland. The expansion of the levator is seen between these. E. R., external rectus; Inf. O., inferior oblique; Conj., conjunctiva; Sep. O., septum orbitale, L. T., levator tendon.

Diagnosis, probably sarcoma. Immediate operation advised.

Operation: April 18, 1916, assisted by Dr. J. E. Briggs. A very satisfactory rectal anaesthesia was administered by Dr. Mary A. Leavitt. The absence of the ether cone is a great advantage in all operations about the eye. Eyebrow was shaved, incision about 2.5 cm. long just under roof of orbit, beginning 5 mm. inward from center of cornea and extending to outer margin of orbit. Tumor was not adherent to periosteum and seemed to be well encapsulated, so that it was easily dissected out. Conjunctiva, and accessory gland were exposed but as latter appeared normal it was allowed to remain. Stump was ligated before excision. The fascia of lower edge of wound was sutured to periosteum, and skin brought together with interrupted sutures. Silk worm gut drain was removed the next day. Healing uneventful, skin sutures removed on the third day. At this time there was complete ptosis, lid edematous. As levator tendon passes between the two portions of gland a lateral portion of it must have been excised with the tumor mass, altho it was not recognized.

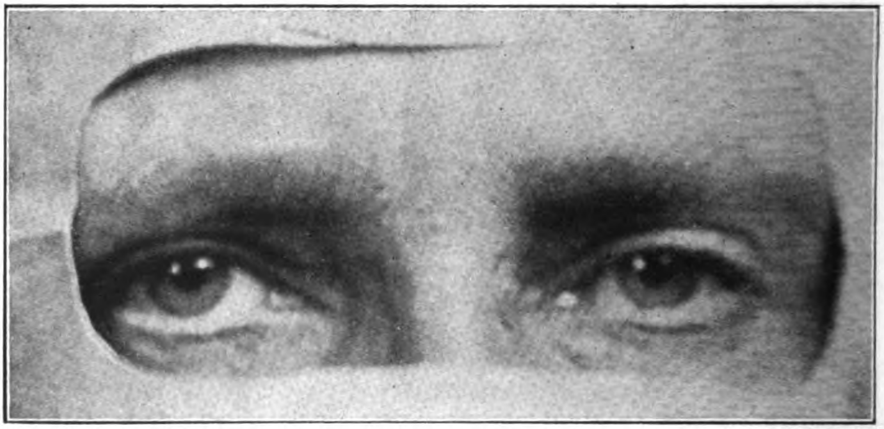


Fig. 2. Result of Excision of Granuloma of Lacrimal Gland (Wells' Case).

On the eleventh day lid could be lifted 3 or 4 mm. towards the inner canthus, and in a month the ptosis was not noticeable. After three years there is no recurrence and there is almost no deformity. The photograph (Fig. 2) really exaggerates the depression. Patient has noticed no lack of tears.

Diagnosis of Excised Tumor.—Dr. W. H., Watters, Mass. Homeopathic Hospital reported: "The tissue received consists of an oval rather soft lobulated mass 1.5 cm. in greatest diameter by about 1 cm. in thickness. On section the mass is found to consist of a grayish white tissue somewhat irregular in arrangement and without any definite limiting membrane. The cut surfaces are practically uniform thruout in both color and consistence.

Microscopic Examination.—The major part of the specimen consists of a fibrous stroma varying in density in different places. This forms the supporting frame work for rounded and oval collections of irregular branched tubular glands. Some of these collections are small, others are. very prominent. The glands vary somewhat in size and shape, for the most part corresponding to the tubular type. They are lined by a single layer of rather high cuboidal cells and present relatively small lumina. In almost all places the differentiation between the epithelium and surrounding tissue is sharply defined. In one small part of the mass, however, when examined by frozen section, a condition very similar to a typical cell proliferation outside the gland is noted. This is not further corroborated in other parts of the tissue.

The interglandular tissue consists of some fibrous elements, numerous blood vessels and large numbers of small round cells similar in size and shape to lymphocytes. These vary in number from place to place in the sections, sometimes being so numerous as to form distinct collections, partly obliterating the gland structure. In one part of the mass received there is practically a complete absence of glands, the tissue here consisting of the more firm fibrous elements arranged in irregular bands. Some glands are here demonstrable however. In this part scattered without order or definite regularity are found collections of larger flattened and oval cells corresponding to the socalled "epithelioid" cells. These are collected in oval and rounded masses and present in the interstices distinct degenerative change. In some places in these masses multinuclear giant cells are found. On account of the presence of these structures a diagnosis of tuberculosis seems fully justified. Moreover, her Wasserman reaction was negative both in this laboratory and when it was examined as an entirely unknown specimen in another laboratory. The skin test for tuberculosis was mildly positive.

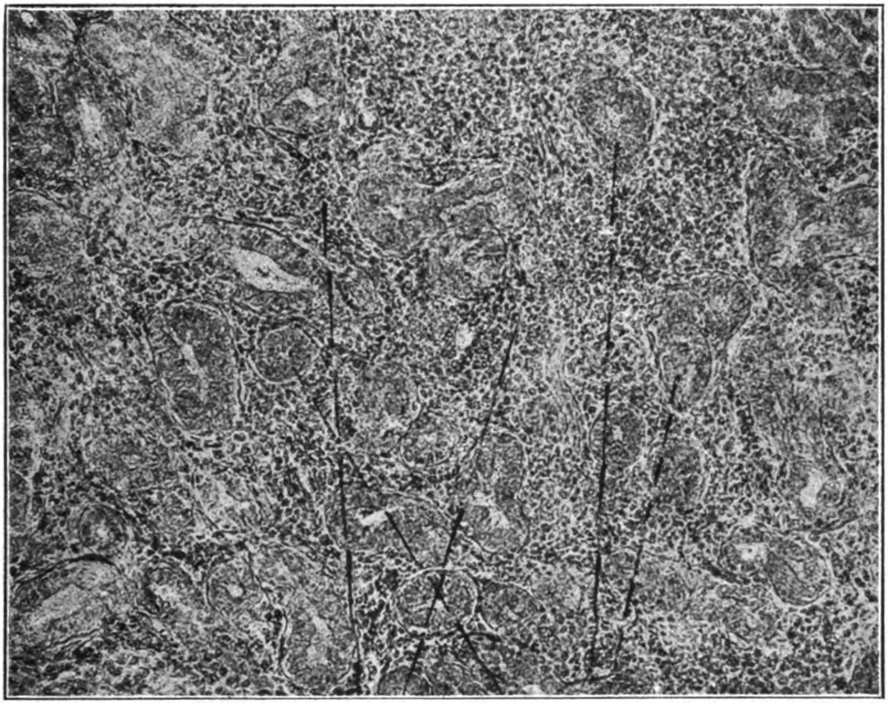


Fig. 3. Section from center of gland showing diffuse inflammatory infiltration.

Dr. F. H. Verhoeff, Mass. Eye and Ear Infirmary, examined the slides, and is of the opinion that the condition is certainly either tuberculosis or syphilis of the lacrimal gland. Judging by the extensive necrosis, the diffuse formation of granulation tissue, and the marked endarteritis present, however, he believes it in all probality is a gumma.

Dr. F. B. Mallory, Boston City Hospital says: "I have gone over the sections of the lacrimal gland once more, and also restained one of the slides for tubercle bacilli. I could find none. The lesions are more vascular than I should expect in a tuberculous lesion and mitotic figures are fairly frequent. Histologically the lesion certainly suggests syphilis but I cannot be positive. I should advise the therapeutic test, that is, potassium iodid and perhaps mercury. If any lesion still persists a guinea pig should be inoculated in order to make a further test for tuberculosis."

As after three years there has been no clinical manifestation of syphilis, tuberculosis or malignant disease, the only diagnosis tenable is Infectious Granuloma.

Lacrimation.—As previously stated this patient noticed no lack of tears, but the palpebral portion of the gland was left intact. Wurdemann says:

"Removal of orbital gland but partially diminishes the lacrimal secretion, tho it is lower than the physiologic normal. Even true weeping occurs from grief or irritant stimulation. Removal of both orbital and palpebral portions, or the palpebral gland alone, gives a dry eye for ten days or so; but soon compensation occurs, enough watery fluids being secreted to fully lubricate the conjunctiva."

The writer removed the papebral portion of the gland alone in three cases, where epiphora persisted after extirpation of the sac, Meller technic, and altho epiphora ceased no dryness was noted.

The following references to tuberculosis and syphilis of the lacrimal gland have been found, tho it is not claimed to be a complete bibliography, Thos. R. Pooley, and Bennett S. Beach[2] report one case which they diagnosed preoperative as sarcoma. The pathologist reported "numerous small miliary tubercles with a few scattered giant cells. The tissue was in small pieces."

W. D. Hall[3] reviews at some length Fortunati's report,[4] of one case of tuberculosis of the lacrimal gland, no T. B. He quotes Fortunati as stating that he was able to collect 13 reports of cases similar to his own, but we have not been able to find the article to see if he gave references to these 13 other cases.

Lapersonne[5] reported one case which was diagnosed macroscopically adenosarcoma. Microscopically Prof. Herman found probably tuberculosis.

Würdemann[1] reports a case of bilateral tuberculosis of lacrimal gland. However, this patient had had syphilis four years previously with no treatment for a year. Dr. Arnold Knapp (personal communication) very distinctively remembers a case of tumor of the lacrimal gland which his father removed, which was regarded to be a sarcoma, but proved on examination to be syphilitic. He has furnished additional references, the last three, to syphilitic involvement of the lacrimal gland.

Warthen[6] found in literature 132 tumors of the lacrimal gland excluding abcess and tuberculosis.

REFERENCES.

1. Würdemann: American Journal of Ophthal., v. II, p. 201, 202.
2. Pooley and Beach: New York Policlinic, 1893, v. I, p. 72.
3. Hall: Ophthalmic Record, Jan. 1905.
4. Fortunati: Annali di Ottalmologia, v. 38, p. 750.
5. Lapersonne: Archives d'Ophtalmologie, 1892.
6. Knapp: Archives Ophthal., v. 19, p. 601.
7. Chalons: Med. Zeit. der Nervenheil., 1859.
8. Streatfield: British Med. Jour., 1882.
9. Albini: Annali di Ottalmologia, 1887.

LOCATION OF TREPHINE OPENING IN GLAUCOMA SUBSEQUENT TO CATARACT OPERATION

RALPH I. LLOYD, M. D., F. A. C. S.

BROOKLYN, NEW YORK

This is the report of a case of preliminary iridectomy, Smith-Fisher intracapsular extraction, glaucoma, posterior sclerotomy, corneo-scleral trephine (above), trephine (below), and iridotomy, with some discussion of questions arising in connection with it.

A. K., aged 70, came to the office because of poor vision in the right eye. He had a well advanced cataract on this side which permitted the recognition of light and dark. The vision of the left eye was 10/200 but was improved to 15/30 with a couple of letters in the line next lower, if +2.50 s. ⊃ +1. cyl. axis 30° was used. With appropriate presbyopic correction, he was able to read No. 2 with some difficulty. As the left eye was not badly affected, a correcting glass was prescribed with instructions to report from time to time, that he might be kept under observation.

Two and a half years later, the left eye had lost vision and changes in the lens were clearly perceptible. He now could read two letters of 15/50 with correction. Six weeks later a preliminary iridectomy was performed on the right eye with perfect result as far as the eye was concerned. There was no inflammation or trouble with the eye, but the patient was hurried home on the third day to avert an impending mental collapse which was not understood at the time but which later became plain. Three months later, the lens was successfully extracted in the capsule according to the Smith-Fisher technic. The eye was dressed for the first time on the fifth day when it was seen that the anterior chamber had not formed but two days later this was reestablished. There was moderate pain and a little redness of the eye from the twelfth to the sixteenth day, at which time the drop patch was used for two days only; because a small pouting of the wound appeared above.

A pressure bandage was applied and not removed for three days. This was removed for inspection of the eye on the twenty-first day, and elevated tension recognized in spite of the bulging wound. Miotics were used, local moist heat and a pressure bandage, and on the thirtieth day, the patient was allowed to go home for a holiday because the wound had flattened nicely; but the tension was still plus to examining fingers.

There were no illusions that the patient was well, and when he returned at the end of forty-eight hours, the bulging was more pronounced than ever, in spite of continual application of the pressure bandage while away. At one time there were three small bulging spots along the incision, the center one having a bead of vitreous protruding at the top. The tension was taken and found to be 45 mm. by the Schiötz tonometer. The cornea was pushed forward along axis 90°, and apparently retracted laterally, thus giving a corneal surface quite different from that for which any tonometer was planned. We think the eye was harder than 45 mm. in spite of the bulging wound with the small bead of vitreous like a jewel in a setting. Theoretically it is difficult to conceive of much elevation of tension with a bulging wound and a presenting bead; but in these cases the vitreous is pushed or tipped forward at the top along the line of least resistance and probably blocks the anterior chamber above; and it may even block the wound as far as the aqueous is concerned, the bulging being possible thru the iridectomy wound in the iris. This seemed to be the state of affairs in this case. Miotics were used in this case at different times but seemed to have no effect, as would be expected.

At the end of the fifth week of ups and downs, after a sudden severe pain; the wound was found once more to have flattened down and everything looked well except some distension of the veins leading from the ciliary region and the tension to the fingers and tonometer still up. A posterior sclerotomy was done without any effect upon the tension. This is difficult to explain as a temporary effect was expected with some confidence. One week later, the wound was again bulging with the bead of vitreous tipping the single protrusion located in the middle of the incision above.

A corneo-scleral trephining was done without disturbing the vitreous bead. The site selected was above, over the opening of the original iridectomy. Some difficulty was experienced because of effects of two operations done previously upon the conjunctiva and periphery of cornea. It was not easy to get the corneal layers to separate so as to locate the trephine opening as far forward as was desired but we proved our entrance into the anterior chamber by entering a spatula. The escape of aqueous was not free. There was no reaction of any kind; but five days later, the tension was 45 mm. again according to the Schiötz instrument. There was no immediate return of the bulging but the vitreous was still tipped forward above, and the pupil was gradually climbing upward. The miotics had originally acted in a peculiar manner; the lower half of the iris would contract to the limit but the upper part did not respond, resulting in a pupil located altogether above the center.

On the fifty-sixth day, another corneo-scleral trephining was done below and success was immediate. The iris was drawn taut and the pupil above the level of the edge of the lid in ordinary use. It was not easy to do an iridotomy and an iridectomy was impossible. The aqueous escaped freely, the tension fell and never came above normal limits again. There was no reaction and the wound flattened down promptly. By raising the upper lid high enough to expose the displaced pupil, the patient could see objects.

Time was allowed for the eye to adjust itself, and soon the displaced vitreous had gone back into place. Thru a keratome incision two parallel incisions were made in the iris, resulting in a very good pupil located where nature arranged for it to be. The tongue of tissue between the incisions retracts and is out of the way. With a +10. ⊃ +1 cy. axis 180°, he can read 15/30; and with the usual allowance for near can read No. 1, with difficulty. His tension is now 23.5 mm. for the right and 22 to 23.5 for the left eye, taken on the Schiötz instrument.

Some time after the glaucoma was recognized, it was found that a moderate allowance of whiskey transformed our patient from a nervous and complaining creature into a happy man. We also learned that it was his habit to cry himself to sleep, it being not unusual for him to cry for an hour or two at a time. He also says that he struck his eye against an object about the fifth or sixth day. Two most important factors in the development of glaucoma are evident.

Glaucoma after cataract does not offer much hope as a rule and iridectomy is recommended. As a preliminary iridectomy had been performed, it did not seem likely to offer much, in this case; so the trephine was given the preference. The location of the opening above was certainly not wise, and blocking of it and the anterior chamber angle by vitreous was evident. The happy result is offered because we were not able to find much help in the literature when we were considering the situation. The point of choice of location has not come to our attention before, altho someone has likely found out that it certainly is wise to take the bulging vitreous into consideration, when the decision is to be made as to the place where one shall trephine.

The vitreous even if it presents in small quantity, as it did in this case, evidently does not relieve pressure to any extent and it is probable that in the future, cases which have been classed as delayed union and cystoid wound may find their way into the glaucoma group. We are naturally rather conservative about taking tension with either fingers or an instrument very soon after a cataract operation, but it seems that glaucoma either sets in or recurs more often than we think. There are many cases in which glaucoma simplex seems to have existed without signs; certainly with the disc obscured, we are at a disadvantage; and it is not possible to make a correct diagnosis if the patient comes for operation late after the lens is generally blurred. These are the cases in which it is easy to upset the equilibrium of secretion and excretion by an operation, even an iridectomy.

In spite of the fact, that the vitreous may block up the excretory angle to the aqueous, the bulging of the wound must have been a safety valve to a certain extent in this case. The ophthalmoscope, now shows no cupping of the disc, a moderate displacement inward of the retinal vessels and a slight general haze.

Most of the effects of alcohol or of its withdrawal, come to be well known to anyone who has spent hours caring for alcoholics in general hospitals located in large cities. In fact, most of us are in the habit of sizing up the patient who is to be operated for evidences of alcoholic habit, in order to avoid the unpleasant results which occur after sudden cessation of its use. The peculiar "melancholy" which affected this patient is the first of its kind to come to my attention.

It would seem that the case reported suggests the efficacy of the Elliot operation in glaucoma after cataract; that the trephining should be made, if there has been an iridectomy, at some place where the iris can hold back the vitreous which is thrust forward; that the pressure may go quite high, even if the vitreous is protruding somewhat and the wound pouting in one or more places. Finally, it would seem from this and other recent experiences that an elevated tension is not infrequently the real cause of delayed union.

STRABISMUS.

FRANCIS VALK, M. D.; SC. D.

NEW YORK CITY

This paper urges that operation may properly be considered in connection with every case of strabismus, and that apparent cure by other means may only be conversion of heterotropia into heterophoria.

In the issue of the AMERICAN JOURNAL OF OPHTHALMOLOGY, September, 1918, at page 667, Dr. Clarence Loeb of Chicago has honored me by quoting several portions of my paper on Strabismus, read at the meeting of the Academy of Ophthalmology in Boston, 1914. He states that "the author's style is somewhat involved and difficult to follow," and this must be true for he seems to have omitted or failed to notice that my principal thesis was to advance the muscular theory of strabismus *per se* and that the advisability of "operating in all cases" was brought forward only as a *suggestion*. Whereas I still hold that an operation may be indicated; my paper, while admitting that many cases of strabismus are corrected, as far as the cosmetic results require, without any operation, nevertheless the question arises as to whether or not these cases are cured.

One boy with a hyperopia of 3 D. and certain symptoms of asthenopia will be given glasses that correct the refractive condition, and the case is cured as far as our present knowledge permits. But in the case of another boy who has the same refractive condition and also a convergent squint, tho we put on the glasses and the squint seems to be corrected, can it be stated with certainty that the case is cured? Do we not realize that the primal cause of the squint remains? Is not the deficient outward rotation still the same? Should anything more be done when we have simply changed a case of esotropia to one of esophoria?

Considering the same argument, are not many cases of esophoria now corrected and cured by a "suitable operation," notably that of shortening the weak muscle; an operation that today has met with such decided success and approval that we have fully twelve different methods of producing the same result? If we are justified in an operation for esophoria, it may be indicated in all cases of squint, not only to correct a deformity but to cure it.

I do not hesitate to employ the methods

of atropin, glasses, etc., advocated so strongly by Dr. Loeb; and if the squint is corrected, I must be satisfied and continue to change the glasses every few years. But if I am asked my opinion from a purely scientific point I would still advise an operation.

To return to the argument of Dr. Loeb's paper, it seems to me that he must have based his conclusions on the old method of tenotomy of the interni in convergent squint. On that proposition I am fully in accord with him, that no operation should be advised until all other possible means have been tried; but ophthalmology has not been standing still during the past two or three decades; so it seems to me that a tenotomy for the correction of the squint would, at present, be a very archaic suggestion, and perhaps it would be best to incur the "possibility of losing the patient." On the other hand, if we tell the parents that the operation proposed will make the child's eyes much stronger and better able to stand the strain of future studies, though he will need the glasses just the same, then that advice is fully justifiable, and I find very few who will seriously object to that procedure. Furthermore, Dr. Loeb tells us that my paper was the motive for an investigation of those of his past cases in which glasses were used. He found twenty-seven with a little more than one-third correct, that is to say, good fixation and the correction of the squint; but only twenty-seven responded, and is it not fair to conclude that those who did not answer his questions were all failures?

The use of atropin and glasses with the benefits they produce in cases of strabismus has been advanced repeatedly since the publication of Donders' antithesis. I do not think, however, we should limit our work to that thesis of fifty years ago, but we should endeavor to find some method that will produce results better and more permanent than those that were given to us by the eminent teachers of ophthalmology of that age.

Dr. Loeb's presentation of his conception of the advice for the correction of squint is certainly very academic and possibly practical, but is it scientific? In other words, if our investigation and experience lead us to certain conclusions, shall we present and advise them to our patients or to their parents, fully stating our reasons for so doing; or shall we temporize with the case, when in our opinion an operation should be performed for the future benefit of the patients, and when, moreover, we can state that to our knowledge an operation rarely, if ever, results in divergence.

We do have the two procedures to select from, namely, glasses or operation, but I do not consider that by employing one or the other indiscriminately we can "accomplish the same end equally well." The simpler one is not always to be preferred, and I do believe that all operations for simple squint should be invariably successful.

I have no doubt that Dr. Loeb has many cases of convergent strabismus that were corrected by glasses, but he must have operated on many others. Then why did he operate? Was it simply because all other methods failed? At the present time, I am trying to follow out this procedure in all my cases of convergent squint. Until a child is five years old, I tell the parents to let his eyes alone. They will not get any worse, nor will the amblyopia increase. When the child reaches that age, I carefully examine the refraction by all the objective methods and follow with an examination of the motility or rotation of the eyes with the tropometer. If this shows a decided deficiency of outward rotation in both eyes of less than 40, I do not think glasses will be of any service, though to counteract the "possibility of losing the patient," I may try atropin and glasses. This failing in a reasonable time, a month or two, we must and should advise an operation. On the other hand, if we find a fairly good outward rotation in the non-squinting eye, then I think glasses will produce a very grateful result in the correction of the squint. But, in adopting this method, as I said before, I have simply changed a case of esotropia into one of esophoria, in which many of our writers recommend an operation.

To illustrate my work, I will record a few cases.

No. 4501. J. S., age 9—C. C. S.—Periodic L. E. turns in, good fixation at times. R. E—20/15. L. E.—20/100. Hy +5, with Ah. Rotation R. 45° in 45° out. L. E. 55 in 30 out. Advice: operation and shortening L. ext. Result: lost the patient.

No. 4956. Miss A. K., age 5—C. C. S. 2nd class. V—20/20 each eye. Hm. +2 D.—Rotation R. 50° in 30° out. L. E. 60° in 25° out. Atropin and glasses do not correct. Advice: operation shortening both externi at once. Result: lost the patient.

No. 4636. Miss C. S., age 6—C. C. S. onset at second year. V 20/20 each eye, wearing glasses, partially correcting squint but with constant headache when reading. In this case I at once advised an operation on both eyes, shortening the externi and declined to try any further use of glasses, as rotation shows 60° in, 40° out. Each eye. Result: lost the patient.

No. 7120. J. B., age 7—C.C.S. 2d class. V. = 20/15 in each eye. Hm.+2.50. Rotation, R. E. 60° in. 40° out. L. E. 60° in. 35° out. Operation shortening both externi. Result: perfectly good fixation and binocular vision.

Can we have any better illustration than this of the need of an operation?

No. 7499. Mrs. D. J. W., glasses +1. D. by others. No comfort. History of C. C. S. for some years when a child. (This illustrates the old saying that squint may correct itself; but does it?) Has constant strain when using the eyes and worse when looking at motion pictures. V=20/15— each. Refraction Hy with Ah. 180° Rotation R. 45° in and out. L. E. 55° in, 40° out. This is almost a case of dextrophoria, as the R. E. tends outward. She now has no squint but I think an operation shortening on the left eye will help her and should have been done when a child.

No. 5026. J. S., age 23, C. C. S. 2nd class. Wearing glasses fails to correct. V. = 20/20 each. Refraction H. and Ah. rotation R. 60° in 40° out. L. E. —50° 30° out. Advice: operation. Result: lost the patient.

These are cases in which I felt it essential that they should have an operation, and declined to consider any other procedure, as my results in many other cases have given me much satisfaction.

No. 7426. Miss L. B. Operations on the ocular muscles by three oculists. Probably tenotomy and advancement L. E. Result: cosmetically fairly good the R. E. turning in with pain in both eyes and cannot focus. V=20/15 each eye. Refraction H. and Ah. Rotation R. E. 50°—40° out, L. E. 40° in, 50° out. From this examination one may fairly conclude that this was originally a case of C. C. S. 2nd class. If this is correct, a free shortening of both externi would have produced a much better result and not a bad case of sinistrophoria.

Now I have no objection to Dr. Loeb's assertion that he "absolutely disagrees with Dr. Valk that an operation should be done in every case," that is the doctor's personal opinion. But I do not think Dr. Loeb will find any words in my paper that present that proposition as my unqualified view. I advanced the theory simply as a suggestion, trusting it might produce a full discussion without a flat denial, and the present article is written with the same purpose in mind.

May I conclude by thanking Dr. Loeb for his reference to Hereditary Squint? This is very interesting to me, tho I regret that he did not explain in his paper just what conditions were inherited in the cases of the children he cites as illustration. That is to say, did they inherit strabismus per se or the hyperopia or the unbalance of the ocular muscles? If the last was the case, then an operation, though not absolutely necessary, may be indicated.

Finally, consider well the rotation of the eye in all cases of squint, as advised by Dr. Howe of Buffalo, and if you have a decided want of outward rotation in convergent strabismus, a shortening operation is indicated on one or both externi, with full confidence of a successful result.

NOTES, CASES AND INSTRUMENTS

A NEW METHOD OF SUTURING IN THE ADVANCEMENT OPERATION FOR STRABISMUS.

J. G. Huizinga, M.D.

GRAND RAPIDS MICHIGAN.

The suturing of any one of the delicate little muscles of the eye to the eyeball in the advancement operation has been much discussed, and many methods have been proposed. But none of them seem to have received sufficient support from the profession to warrant its general acceptance and thus standardize the technic. Under these conditions it may seem somewhat presumptuous to offer any new method, yet because of its simplicity and the ease with which it can be accomplished together with its positive holding power preventing the thread from tearing its way out through the muscle, we are constrained to submit the following:

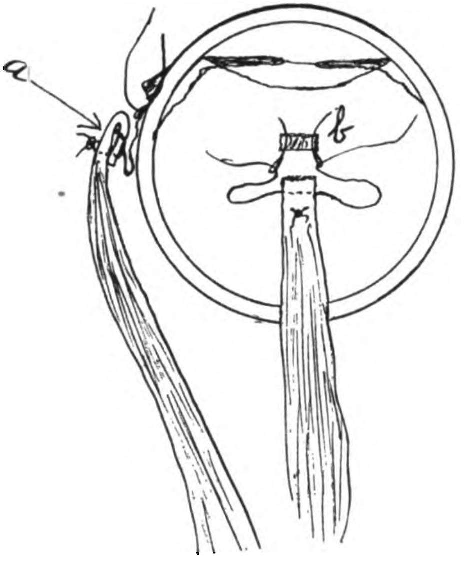


Fig. 1. *a.* Shows loop made by tendon and sutured in shape. *b.* Advancement suture passing through tendon loop and needles in stump of tendon. (Huizinga).

The tendon of the muscle which it is desired to advance is cut at right angles as close to its insertion into the eyeball as possible. The muscle is grasped with any advancement forceps, to prevent it from slipping back and to assist in drawing it forward, etc. The end of the severed tendon is folded back upon itself ***beneath*** the muscle and held in position by passing a suture thru the tendon and muscle, thus forming the end into a loop. A doubled needled thread is passed thru this loop. These needles and thread are then passed thru the stump of the tendon, still inserted into the eyeball, and partly thru the sclera in the usual way. The tying of this last suture and the advancing of the muscle is accomplished as in other operations and they are left in place for the usual length of time. (See Fig. 1.)

We claim for this operation that the sutures positively cannot pull out or cut their way through the muscle; and if they are properly placed and tied to the stump and sclera, the result obtained must be perfect.

THE REFRACTION IN KERATOCONUS.

Dr. José de Jesus Gonzales.

LEON, MEXICO

At the meeting of June, 1902, of the Mexican Ophthalmological Society, Dr. Uribe-Troncoso presented a case of keratoconus with hypermetropic refraction in the periphery of the cornea and pointed out that the authors did not call attention to the possibility of finding this condition in cases of keratoconus. At the same meeting Dr. Ramos spoke of another case that he had seen with Dr. Fernando Lopez, in which vision improved much with a plus cylinder of 3 D., axis 180°.

Wishing to contribute something towards the study of the refraction in this disease, I shall describe an interesting case:

F. Ll. S., a young man 23 years old, born at Zacatecas, strong, well-built, intelligent and educated, came to me because he wanted to go back to his interrupted literary career, and he needed his refraction determined.

Since he was a boy, he noticed that he needed to approximate the book to his eyes in order to be able to read, but he was able to finish his primary and high school studies and was prepared to start his law studies. Recently his old visual difficulty had increased, and far as well as near vision was greatly decreased, there being no satisfactory glasses to improve his sight. He then consulted Dr. Fernando Lopez, who did some cauterization of the cornea, and afterwards an iridectomy, and then the tattooing of the cornea. There was a family history of hyperopia and astigmatism as well as of keratoconus.

The vision was 1/10 and the vision for colors was normal. With the ophthalmoscope the media were clear, and the fundus normal. The optic disc was deformed because it was seen thru the distorted cornea.

With the skiascope the first thing to be noticed was the presence of a circular shadow surrounding the pupil with a lightened center, which is characteristic of these cases. This ring in its deformation gave proof that there was intense astigmatism present. All the examinations were made in the eye that had not been subjected to the tattooing, but in both it could be made well.

The refraction was as follows: taking the meridians of extreme refraction O. D. in the middle of the dilated pupil—10 D., in the inclined meridian 180°,—8 D. in the 80° axis. O. S. in the conical zone —8 D. in the 180° axis, and —3 D. in the 100° axis.

According to these findings I thought that the vision would be improved with concave spherical glasses associated with concave cylindrical ones; but it was not the case, and vision remained as bad as before, and could improve only with convex cylindrical glasses. After making a new examination, with the patient looking upwards, downwards, inwards, and outwards, I found a very high hyperopia, as follows:

O. D. and O. S. Looking up 9 Diopters.
O. D. and O. S. Looking down 9 Diopters.
O. D. and O. S. Looking in 9 Diopters.
O. D. and O. S. Looking out 9 Diopters.

These findings were surprising to me; more so when in a paper we are writing on the Skiascopic Refraction of the Peripheric Areas of the Cornea in Emmetropic Eyes, I had constantly found a myopic astigmatism, because the shadow moves in the same direction in which the eye has moved, this in a vertical line, while in a horizontal line it moves in the opposite direction, the astigmatism reaching up to 3 D.

We then had a patient with strong myopic astigmatism of the irregular type in the more ectatic zone of the cornea, and with strong hyperopia in the peripheral zones of the cornea.

The best correcting glasses found for this patient have been:

O. D. Sph. —4 D. ○ —8Cyl. Axis 80°.
O. S. Sph. —4 D. ○ —8 Cyl. Axis 180°.

With this prescription vision rises for distance from 1/10 to 4/10; and for near sight it allows the patient to read at 25 centimeter degree 9 of the Didot scale, which is the one considered by Professor True as the smallest type for books for the school.

The keratoconus in our patient *does not seem* to be congenital, because he was able to read for a long time during day and night, and could make many strains without much effort. The diminution in vision was made more patent in his eighteenth year, and he was operated on between 19 and 20.

I believe that this patient was born a strong hyperope, because even after the natural diminution of it with the advancing age, we found 9 D. in the peripheral zone of the cornea. The efforts made during reading gave rise to corneal malnutrition, and the cornea became less resistant, and allowed itself to become distended in the middle, became conical and in that area an irregular astigmatism developed of a myopic character.

SOME EYE COMPLICATIONS IN INFLUENZA.

A. S. Green, M.D., and L. D. Green, M.D.

SAN FRANCISCO, CAL.

While it is very difficult to prove that the eye conditions herewith presented are other than mere coincidences the evidence would tend to show that directly, or indirectly, influenza had a bearing upon them.

During the two epidemics of influenza in 1918-1919, we saw numerous cases of conjunctival irritation of lesser or severer degree. There were other cases, however, of a more serious nature and we think the following of sufficient importance to justify putting them on record.

CASE I. PSEUDOGLIOMA, METASTATIC OPHTHALMIA. Annie B., age 3. Always well. Was taken ill with influenza November 9, 1918, and three or four days later contracted pneumonia. When she was ill with pneumonia for about a week her left eye suddenly became blind, very painful and inflamed. Was treated by the family physician. Excepting for the left eye, the child made an uneventful recovery from the pneumonia and was brought to us on February 11, 1919, with the following condition:

Right eye, normal. Left eye, vision, light perception lost. There was a slight general scleral injection with a slight flattening of the globe in the horizontal axis. Under the corneal microscope three or four areas of interstitial opacification of the cornea were found about the size of a pin-head. The anterior chamber very shallow, practically obliterated; the iris somewhat atrophied and lighter in color than the right. The pupil was rigid and dilated to six mm. and adherent to anterior surface of lens. Lens: Anterior capsule slightly clouded and projects forward to the anterior plane of the iris. The rest of the lens clear. An opaque greyish mass of exudate is seen on the anterior surface of the vitreous which fills the postlental region, with three or four blood vessels coursing over it. Eyeball is very soft.

CASE II. IRIDO-CYCLITIS. Sam C., aged 5. Needled for congenital cataract on October 17, 1918. Operation uneventful. Was seen at the office about a week afterwards, and the eye was in a satisfactory condition. The child was not again seen until November 8, 1918, as meantime he and the entire family of five or six members were ill with influenza. When he was finally brought to the office the eye was markedly inflamed and painful. Treatment with atropin and salicylates had little or no effect. The eye finally became very soft and shrunken. Light perception lost.

CASE III. ACUTE GLAUCOMA. Miss C., age 33. On October 26, 1918. Patient went to bed with influenza. The sight of both eyes began to fail. Saw colored rings around lights and a few days later the eyes became very painful. Was seen by an ophthalmologist on November 1, 1918. The case was pronounced glaucoma. The ophthalmologist then contracted influenza and the patient was referred to us January 21, 1919. Examination showed marked injection of both eyes, with tension of right eye of 55 and left eye 69. Vision of right eye 20/25 and left eye 20/50. She was treated by us for a few weeks until her doctor resumed his practice, but responded poorly to miotics and an operation was advised. Her doctor reports that he operated successfully on one eye which regained normal vision and tension. The other eye also eventually regained normal tension.

CASE IV. ACUTE GLAUCOMA. Mrs. A. P., age 28. Was referred to us November 30, 1918. Had an attack of influenza three weeks prior. The left eye became inflamed and painful about November 26, 1918. When examined by us on November 30, we found the patient in a hysteric condition from pain. Examination: Marked photophobia. The eye red and cornea steamy. Vision, hand movements 20 inches. Tension, 55. She was placed in a hospital immediately and responded readily to miotics and elimination, and was dismissed from the hospital December 15, 1918, with vision of 20/20. There has been no recurrence.

CASE V. RETINAL LESIONS. Mr. F. K., age 51. Was taken ill with influenza January 14, 1919. Two days afterwards the vision in the right eye failed so that he was unable to distinguish a fire in the grate. Since then his sight has been gradually improving and on February 19, 1919, his vision was 20/40. Upon examination the following condition was found: The disc slightly congested, with margins somewhat blurred. The blood vessels near the disc under a slight haze. Arterial twigs tortuous. A few punctate hemorrhages scattered between the macular region and the disc. About a dozen yellowish pin-point spots in the macular region.

The patient is positive that prior to his attack of influenza the vision of the right eye was as good as the left, which is normal.

Case VI. Hemorrhage into the Vitreous. Mr. G. S., age 38. Very robust, denies lues, in good health till December 14, 1918, when he was taken ill with a mild attack of influenza. Three weeks following his attack he awoke one morning to find that he could not see with his right eye. When he consulted us on February 22, 1919, we found the following condition: Vision, right eye: Hand movements two feet. With the ophthalmoscope: A large dark red mass was found floating in the posterior part of the vitreous, shifting its position with the movement of the eyes. The blood vessels could be seen very indistinctly. The disc not discernible.

Case VII. Paresis of Accommodation. Miss L. B., age 21. Had influenza during January and February, 1919. Referred to us March 1, on account of inability to read, dizziness and headaches. Examination: Skiascopy, both eyes + 1.00 $\overset{\frown}{\smile}$ + 0.25 ax. 90°. Vision, both eyes + 0.50 $\overset{\frown}{\smile}$ + 0.25 ax. 90 =6/6. Esophoria 8° for distance, 10° for near. Amplitude of accommodation, right eye 6½ D. Left eye, 6 D. Fundi, normal. No other pathologic conditions found in eyes.

SOCIETY PROCEEDINGS

COLLEGE OF PHYSICIANS OF PHILADELPHIA. SECTION ON OPHTHALMOLOGY.

March 20, 1919.

Dr. William T. Shoemaker,
Chairman.

Vernal Catarrh.

Dr. Charles H. Reed exhibited a a male, aged nineteen years, suffering from chronic eye affection for thirteen years. No member of his family or friends have a similar affection.

The palpebral fissure was narrowed and a slight ptosis was present. The palpebral conjunctiva had a milky white tint, with a decided follicular hypertrophy, especially of the upper lids. No cicatricial tissue or bands. The bulbar conjunctiva at the limbus was thickened and spread over four-fifths of the corneal surface of each eye. The color was pale and the tissue had the appearance of a hyperplasia or thickened conjunctiva, with a number of new bloodvessels.

Discussion: Dr. Edward A. Shumway said that he had shown a case of vernal conjunctivitis of the palpebral type before the Section in January, 1918, which had been cured by the application of radium, and had subsequently reported two successes before the Section on Pediatrics of the Pensylvania State Medical Society in September, 1918. The applications had been made by Dr. Pancoast at the University Hospital, large doses, from 35 to 40 mg., being used, at intervals of three or four weeks, according to the ensuing reaction. In one case in which the radium had been left too long in one position, there had been a burn of the conjunctiva, which gradually disappeared. In none of the cases treated had there been an involvement of the bulbar conjunctiva or of the cornea, as in the present instance, but he thought radium might be employed in Dr. Heed's patient, probably in smaller doses, and he advised its trial. He asked Dr. Heed whether a search had been made for eosinophiles in the conjunctival discharge, as their presence would be in favor of vernal catarrh, as against trachoma, to which the condition bore some resemblance in the case shown.

Dr. Zentmayer said the mechanical ptosis and the thickened appearance of the lids, with a somewhat gelatinous infiltration of the conjunctiva of the upper lid, together with the unusual hyperplasia of the limbus and cornea, suggest that the case may belong to the class of cases reported by May, of New York, of mixed trachoma and vernal conjunctivitis. The case is very similar to one shown before the Section some six to eight years ago by Dr. Posey.

Multiple Dermoids of Eye, With Other Anomalies.

Dr. Wm. Zentmayer showed photographs of a woman, aged thirty-eight years, with symmetric dermoids of the sclerocorneal margin with a dermoid of the cornea of the right eye. The sclerocorneal growths were about the size of a white bean, of chamois color, pultaceous in feeling and presented several cilia projecting from the surface. The corneal tumor was somewhat conical, yellowish-white and projected between the lids. There were well-marked supernumerary auricles on each side of the head and there was a very marked megalastomia. The right eye was converged about 80 degrees. Marked scoliosis placed the heart on the right side of the spinal column.

At the first operation the sclerocorneal dermoids were removed and about ten days later the corneal growth was dissected off. Two weeks later the right external rectus was advanced and the internal rectus tenotomized. Later the supernumerary auricles were removed and the oral fissure was closed to a point to make the mouth symmetric. The obliquity of the mouth could not be corrected.

Retina Supplied Entirely from the Cilliary Circulation.

Dr. Zentmayer showed a colored woman. In the right eye there was a large cilioretinal artery which emerged at the upper border of the papilla and at 1½ d. d. from the disk bifurcated, one branch going to the temporal fundus, the other to the nasal. A second large one emerged at the lower outer border of the disk and almost immediately divided, both branches supplying the inferior temporal region. A third came out at the lower inner border and bifurcated at 1½ d. d. from the disk. Both branches supplied the inferior nasal fundus. A small cilioretinal vessel came off at the middle of the nasal margin of the disk. All the vessels had the characteristic crook bending back on the surface of the disk before being distributed to the retina.

Cyst of Iris.

J. M., male, aged twenty years. Seen at Wills Hospital February 28, 1919. He comes on account of attacks of blindness in the right eye. The first attack was in June, 1917, while caulking. Vision was reduced to Lt. Per., which lasted a couple of days. Vision recovered completely, but halos have persisted. No pain. Between this time and February, 1919, the interval of attacks was about six months. Since the latter date they are almost constant, there being but slight intermissions. Family history negative. A "spot" had been noticed in the R. E. since early childhood. Vision: R. E., 6/9 pt.; L. E., 6/6 pt. Tension R. E., 30 mm.; L. E.,, 20 mm. Field, R. E., slight irregular contraction, with a reentering angle below.

R. E. Iris light hazel. Cyst chocolate brown. Mass is 4.5 mm. by 3.5 mm. and fills the angle of the chamber from the outer border of the sphincter to the ciliary border. It is dome-shaped with the convex above. The borders are rounded and cast a shadow on the iris. The surface is smooth except for a slight thickening of its anterior surface near its base.

The larger circle of the iris is greenish gray in temporal segment but is hazel in its nasal half. The anterior chamber is deep; the iris reacts well to light. The fundus is normal.

Under the use of pilocarpin, vision has increased to 6/6 pt. and T. = 22 mm.

The case belongs to the idiopathic type of iris cysts. The pathogenesis is obscure, but they have been explained as arising from a blocking of an iris crypt. Some sort of surgical interference is indicated. Either the surface of the cyst wall may be excised or an iridectomy including the growth should be done. The latter would seem to be the surer operation.

Ocular Motor Palsies as a Sequel to Influenza.

Dr. Zentmayer related the histories of three cases for the purpose of bringing the subject before the Section.

A. K., aged twenty-eight years, physician. Seventeen days ago taken with slight headache, general muscular weakness and hyperesthesia of the left side of the chest and the right side of the face. Three days later developed diplopia. Two days ago weakness of the right side of the face and nystagmus.

There was paresis of the right external rectus and nystagmoid movement of the eyes, especially marked in looking to the left. Weakness of the entire seventh nerve, the fundus and fields were normal.

W. H., aged thirty-one years, male, stock broker. He was seen in consultation with Dr. Maxwell Langdon. Four days ago he began to feel heavy and drowsy. For this he took fractional doses of calomel. Two days later he found difficulty in focussing. No diplopia. Vision normal. Homonymous diplopia behaved as in paralysis of divergence. L. H. 3 degrees.

The third case was that of a young woman, seen at Wills Hospital, who had a paralysis of the right external rectus.

In all the cases the symptoms were recovered from in short time. In all there had been an attack of influenza which had been apparently recovered from. Lethargy was not present in any of the cases.

Dr. Zentmayer did not think that any of the above cases could be considered as belonging to the type occuring in various parts of the world and to which the term lethargic encephalitis has been given.

Discussion: Dr. Edward A. Shumway said that many of the members present must have been struck by the number of ocular palsies which had been appearing of late, and he reported in some detail six cases, in one of which there had been a history of influenza, but in the other five no such history was obtainable. With the exception of the postinfluenzal case, they had shown marked drowsiness, in some instances stupor. The oculomotor and abducens nerves were the most frequently affected, and in two the facial nerve was involved. In one of the latter the sympathetic fibers were apparently disturbed, as there was narrowing of the palpebral fissures, widening of the pupil and a slight enophthalmos on the paretic side.

One patient had died at the end of two weeks, respiratory failure and high temperature appearing just before death, altho the ocular paralysis had been clearing up. Unfortunately no postmortem examination could be obtained. In three cases there was decided disturbance of speech, the patients talking in a slow, drawling manner. In one instance the Wassermann test was positive, but the suddenness of the onset with fever seemed to warrant the placing of the case in the same class as the others. They must be considered as a polioencephalitis, and apparently closely resembles a case of "lethargic encephalitis," which have been described in epidemic form in England, France, Germany and Austria during the past year. Similar cases have been seen in various parts of this country, notably in New York, Chicago and Baltimore, so that the epidemic is evidently spreading here and more cases are to be expected. Whether they have any relation to the influenza outbreak is as yet unsettled, but we have evidently to deal with an acute, probably infectious process involving the centers in the neighborhood of the corpora quadrigemina and extending downward in some instances into the pons and even into the medulla.

Dr. S. Lewis Ziegler said that the discussion so far had not noted the fact that paralysis of the external muscles of the eye may have a local peripheral origin, such as exposure to cold or a draft striking the eye. This is on a par with cases of Bell's palsy arising from exposure to cold weather when the patient sleeps in the open after a debauch. Three cases of paralysis of the external rectus consulted Dr. Ziegler within a few days of each other, each giving the history of sleeping in a draft during a spring night when the weather suddenly changed from a high temperature to a low one. All of these cases yielded to the combined galvanofaradic current, two recovering after one month's treatment and one after three months.

Silver Wire Arteries

Dr. Charles R. Heed exhibited a male, aged fifty years, presenting marked changes of the retinal arteries of the right eye. Physical examination disclosed a chronic pleurisy, emphysema, enlarged heart and a general arteriosclerosis. Blood, Wassermann negative.

Fundus. R.: Disk pale; margins irregular and exudate covering surface; veins were moderately dilated and tortuous; arteries showed sclerotic changes of an advanced state; temporal vessel appeared as a solid white line. The other arteries appeared as chalky white lines with a central blood column. L. Disk margins clear; color pale; retinal vessels show no gross changes.

Discussion.—Dr. Zentmayer said the retinal arteries in Dr. Heed's case were not "silver wire" in the sense in which this term is usually applied, that is, they do not show hyalin thickening but rather a perivasculitis. This in connection with the enlarged veins, the atrophy of the nerve and the connective-tissue formation on the surface of the papilla suggested that the case was one of postneuritic atrophy.

J. Milton Griscom, M. D.,
Clerk.

ROYAL SOCIETY OF MEDICINE.

Section of Ophthalmology.

June 4. Mr. W. T. Holmes Spicer, President.

Relation of Pituitary Body to Carotid.

Mr. J. Herbert Fisher exhibited, by means of the epidiascope, a life-size drawing through the center of the optic chiasma, to show the pedicle of the pituitary body and the intimate relationship between the lateral boundary of the pituitary body and the inner wall and internal carotid artery. This artery, having come forward in the floor of the cavernous sinus, made a bend with its convexity forwards as it ascended to pass on the mesial aspect of the clinoid process on its anterior aspect. It also showed the ophthalmic artery coming off.

Mr. Fisher considered that if there were a swelling of the pituitary body. of either a transient or permanent nature, it was very likely to cause an immediate effect on the carotid artery by indenting its inner wall and so interfering with the blood flow, and producing thereby an effect on the cerebral, and possibly also the retinal, circulation.

This section seemed to support the view he recently brought before the members, that possibly an abnormal state of the pituitary body might be responsible for some varieties of migraine, and explain such attendant symptoms as aphasia. Some further support was derived from the fact that during an attack of migraine it was common for the superficial temporal artery to be tense and cord-like. If the enlarged pituitary caused compression as he suggested, then more of the blood brought up the neck by the common carotid must be diverted and fill up the branches of the external carotid, of which the temporal artery is the most easily investigable.

Connective Tissue in Front of Disc.

Mr. L. V. Cargill showed a case of pigmented connective tissue in front of the optic disc of the left eye. When the patient, a soldier, was in France, in 1918, he was struck in the face by shrapnel. As the man was complaining of blindness, his condition was described there as evulsion of the optic nerve. It did not have that appearance, however. The history showed that the man had no vision in that eye before he was recruited. The disc of the left eye was practically hidden by this mass, which projected beyond the level of the fundus some 3 to 5 diopters. From some of the radiating white streaks, blood vessels could be seen to emerge. He thought it must be due either to some defect of a congenital nature, to trauma, or to inflammatory change. His view was that it was due to a hemorrhage, which might have occurred at birth. Obviously it had no relationship to the facial injury by shrapnel.

Obstruction of Retinal Vessels.

Mr. F. A. Juler showed a patient with obstruction of retinal vessels, with patent vessels, following an electric flash. This case of embolism of the central artery of the retina showed some unusual features. The part of the retina on the outer side of the disc looked healthy and was not opaque, and there was a small cilio-retinal vessel supplying this part of the retina. With regard to the nature of the obstruction, the man had an extensive heart lesion, which Dr. Langmead regarded as probably congenital. At this date, a fortnight after the onset, the retinal arteries of this eye had as large a caliber as that of the other eye vessels. The existence of the heart lesion made it difficult to escape the view that the obstruction was due to embolus in the central artery of the retina. The man was engaged in his electrical work, when a flash took place about six feet from him, and two hours later the eye was gradually becoming blind. An hour after that the sight came back almost completely. When, however, he went to sleep shortly afterwards he awoke with the eye again blind. The diminished force of the heart's action during sleep probably enabled the blockage of the artery to again become complete. The question of compensation having arisen, he gave the view that there was a causal connection between the flash and the blindness.

Melanoma of Choroid.

Mr. Foster Moore exhibited a case of melanoma of the choroid, which had remained stationary for 5½ years. It showed the characteristic "blue ointment" color, which was uniformly distributed over the growth. It was only discovered on routine ocular examination. The pigment appeared to be intracellular.

Visual Perception of Solid Forms.

Mr. E. M. Eaton contributed an exhaustive paper, illustrated by many slides, on "Visual Perception of Solid Forms." He showed that the binocular element was the essential factor in stereoscopic vision. The stereoscopic quality was not an exclusive attribute of binocular vision. It must be recognized that as experience increased, sensation came more and more to assume an objective character, and ultimately it became undifferentiable from perception. This was not equally true of any other sense, if indeed it were so at all. In the ordinary view of objects there was no conscious relic of the abstract sense of light; there was merely an impression of the perception of the object seen.

It was possible to so suppress the image of each retina. If two retinal images did not fit each other satisfactorily, it was possible to automatically cut off the projecting portions. In fact, in only a few circumstances did one utilize the whole of both retinal images. When it was said that by means of binocular vision a view could be obtained around objects, it really meant that spaces behind them could be appreciated, as in looking across a sandy desert in sunshine and perceiving the air agitation due to altering states of atmospheric density and therefore refracting power.

Discussion: J. H. Parsons spoke of the great value of the paper, especially in connection with the visual problems of aviation. He said the contribution invited very careful study.

H. Dickinson.

AMERICAN MEDICAL ASSOCIATION.

Section on Ophthalmology.

JUNE 11-13, 1919.

CHAIRMAN, CASSIUS D. WESCOTT OF CHICAGO.

The chairman made a brief address introductory to the business of the meeting.

Ophthalmology and the Physician.

CHARLES P. EMERSON of Indianapolis, read a paper, (published in full, JOURNAL OF THE A. M. A., v. 72, p. 1817), in which he discussed the relief of eyestrain, especially headache, sensitiveness to light and colors, forms of vertigo and dizziness, and other nervous and mental symptoms; and the relief possible thru correction of anomalies of refraction and movements of the eyes. Viewing the subject from the standpoint of the internist, his paper was of a particular value to ophthalmologists.

Refinements in Examination of Refraction.

WALTER L. PYLE, of Philadelphia, presented this paper, (published in full, JOURNAL A. M. A., v. 72, p. 1821), dealing especially with refinements, he regarded as necessary but often neglected, in the examination room and its lighting, test lenses and frames, the necessity for return examinations, test charts—objective methods, which he thought almost indispensable but not to be relied on against careful subjective examination.

Present Status of Refraction Work.

E. J. GARDINER, of Chicago, presented a partly historical sketch from which he drew lessons for younger colleagues (see JOURNAL A. M. A., v. 72, p. 1824).

Muscular Anomalies.

SAMUEL THEOBALD, of Baltimore, regarded the correction of muscular anomalies as secondary in importance only to the correction of the faults of refraction, and he believed they were often overlooked, supporting his contention with statistics and giving methods of diagnosis. (See JOURNAL A. M. A., v. 72, p. 1827.)

Ophthalmic Service in American Expeditionary Forces.

ALLEN GREENWOOD, of Boston, presented briefly the paper, published in full on page 565 of this JOURNAL.

Control of Trachoma.

GEORGE S. DERBY, of Boston, presented his paper on Control of Trachoma among the Alien Labor Companies working in connection with the British and American Expeditionary Forces in France, (published in full, p. 500).

Group Studies in Ophthalmic Research.

The paper on this subject by F. PARK LEWIS, of Buffalo, has appeared in full (JOURNAL OF THE A. M. A., v. 72, p. 1893). It urges that for an understanding of ocular diseases an investigation is necessary of conditions that lie outside of the eye itself; and for this reason, cooperation is necessary with workers specializing in other branches of medicine and general science.

Daylight Illumination of Interiors.

EDWARD JACKSON, of Denver, presented a paper on this subject, to be published in full in this Journal.

Family Degeneration of Macula.

ROBERT BLUE, of Chicago, presented this paper, which will be published in the JOURNAL OF THE A. M. A. It reports the history of a case in which vision began to fail at the age of 12 or 13, and at 18, had fallen to 6/60. A younger sister, aged 10, had normal eyes and vision. The facts regarding nine other families reported in the literature, are given in tabular form.

Action of Radium on Cataract.

MARTIN COHEN and ISSAC LEVIN, of New York City, presented a paper, (to be published, JOURNAL A. M. A.), reporting the results of exposure to radium of 24 cases of incipient senile cataract, from which they conclude: that such application of radium is harmless, and that there is a diminution of opacity under its influence. It causes no difficulties for subsequent extraction. It is therefore advisable to test its influence on partial cataract.

Immediate Capsulotomy in Cataract Extraction.

A. G. Bennett, of Buffalo, presented a paper on this subject which will be published in full in this journal.

Hyaloid Membrane Following Cataract Operations.

S. Lewis Ziegler, of Philadelphia, called attention to this condition and reported a case. His paper will be published later.

Autotoxic Factor in Sympathetic Ophthalmia.

Arnold Knapp, of New York, presented a paper, (Journal A. M. A., v. 72, p. 1897), reporting four cases of sympathetic ophthalmia of the type of serous cyclitis, with attendant symptoms suggesting toxic manifestations. Choroidal and macular changes were present in all cases. In three cases an eye was enucleated, and two of these were subjected to examination. The typical sympathetic ophthalmic infiltration was pronounced, especially in the posterior half of the choroid about an inflamed optic nerve. In these cases there was generally a history of improper diet and over eating associated with constipation. The recognized treatment by use of mercury and salicylates, of course, favors elimination of such toxic factors as may be present. Sources of focal infection should also receive careful attention.

Treatment of Symblepharon and Restoration of Orbital Socket.

William H. Wilder, of Chicago, presented a paper which will be published in full in this Journal.

Relation of Teeth, Tonsils and Toxemias to Eye Diseases.

G. H. Bell, of New York, presented a paper, (to be published in full in the Journal of the A. M. A.), urging the great importance of these causes of ocular disease and the necessity for routine examination for them, and their correction.

Operation for Conical Cornea.

L. Webster Fox, of Philadelphia, presented a paper on this subject which will be published in full in this Journal.

Uveitis.

A. Edward Davis, of New York, presented a paper with special reference to the etiology and treatment in the malignant types of uveal inflammation, (to be published in full in the Journal A. M. A.). The causes are numerous, but the symptoms are seldom alike in any two cases, and the treatment, aside from local measures, must be directed toward the cause, the discovery of which will bring into play all the ingenuity and skill at the surgeon's command.

Cysticercus of the Vitreous; Cysts of Retina; Anterior Lenticonus.

This paper presented by G. E. de Schweinitz and Meyer Wiener, of Philadelphia and St. Louis respectively, will be published in the Journal A. M. A. It reported clinical observations on three cases made at the U. S. A. General Hospital, No. 14, Ft. Oglethorpe, Ga. The first of these seems to be the fifth case of intraocular cysticercus published in this country, and one more thoroly studied and discussed than most such cases in the literature.

The second case presented an ophthalmoscopic picture discovered in seeking the cause of defective vision. The cysts were multilocular, one situated in the region of the macula, and a large group of others farther towards the temporal side. The case of lenticonus was also encountered because of the defective vision.

Foreign Bodies Within the Eyeball.

John O. McReynolds, of Dallas, Texas, presented this paper (to be published Journal A. M. A.) He reported eleven illustrative cases. The three primary questions confronting the surgeon are: What are the location and character of the foreign body? What are the proposed measures of relief; and what will be the probable immediate and remote results? The reported cases are intended to present the different problems to be dealt with.

Treatment of Dacryocystitis by Curettage.

JOHN GREEN, JR. of St. Louis, read a paper on this subject which will be published in full in this Journal.

Treatment of Glaucoma.

JOHN E. WEEKS, of New York City, presented a paper (to be published in full in the JOURNAL A. M. A.), dealing with his personal observations on this subject. He reviewed the principal determining causes of hypertension, the treatment with miotics, and the operations to be considered. His practice when time permitted had been to make a trial with miotics in all cases before advising operation; but experience had convinced him that early operation is desirable. He found neither iridectomy nor the Lagrange operation satisfactory in infantile glaucoma, a trephine opening is inclined to enlarge by stretching, therefore a large trephine should not be employed. For subacute and simple chronic cases, he relies on the Lagrange operation or Elliot trephining. But with idiopathic glaucoma, except in acute cases, we must not expect a high percentage of eyes to retain their vision after a successful operation.

ABSTRACTS

P. Bailliart, The Retinal Venous Circulation. Ann. d'Ocul. 1918, v. 155, p. 453.

The author considers that there are three possibilities in regard to the retinal venous pulsation: (1) The veins do not pulsate spontaneously. This condition was present in 42 per cent of the cases examined. (2) The veins show slight spontaneous movements, synchronous with the pulse rate, etc. This was present in 21 per cent of the cases. (3) A distinct pulsation of the veins is present. This was found in 37 per cent of the cases. This was found either in the portion crossing the disc, or, more frequently, as the vein appears at the bottom of the physiologic excavation. It commences with the ventricular systole and is prolonged after it. Sometimes it appears as a movement of the walls and sometimes as a movement of the whole blood column.

Pressure on the eyeball produces a gradual obliteration of the veins, the end stage being preceded by a breaking up of the blood column into a granular appearance. This was found only in the disc, as the veins on the retina never are decreased in size, however great the pressure. The pulsation of the vein is short and quick. If the vein shows the latter characteristic, it is probably due to impulse transmitted from an underlying artery. Pressure on the eyeball produces either a complete disappearance of the venous pulse before the arterial pulse appears, or it persists and is even increased. There are then two distinct pulsations in the eye, the venous coming first, but the arterial appearing before its completion. This is never found in normal eyes.

The flow of blood in the retinal veins is governed by the *vis a tergo* of the blood as it leaves the capillaries, which decreases as the disc is approached, and the *vis a fronti* due to auricular diastole, which increases towards the disc. During diastole there is a negative pressure in the jugular and contributing vessels, which travels backwards, and during systole there is a positive pressure. The minimum negative is just at the end of the diastole, and the maximum is at the moment of presystole.

The intraocular maximum pressure occurs just when the venous pressure begins to decrease in the larger vessels. If this maximum is greater than the venous pressure where the vein leaves the eyeball, the vein contracts, and if the minimum intraocular pressure is less than the venous pressure at the same place, it dilates. If the intraocular pressure is always greater than the venous, there will be no pulsation of the vein, any increase simply resulting in decreasing the caliber of the veins. If it is always less, the walls of the vein will retain their maximum caliber, but if the difference is great enough, there will be a pulsation of the blood column, resembling a piston stroke. Pressure on the eyeball in the first of the last two conditions will produce a venous pulse, unless the pressure becomes too great, and in the second, will augment the "piston" pulse, until it becomes greater than the maximal venous pressure, when the pulse will disappear.

From the above facts it would seem that in the majority of cases the intraocular tension is about equal to the venous pressure at the point of exit from the eyeball. That is to say, the latter will vary between 18 and 22 mm. of mercury.

C. L.

Valude, E., Radioscopy and Radiography of Ocular Foreign Bodies. (Annales d' Oculistique, June, 1918, v. 155, p. 261.)

In this article the author describes a case illustrating how even a good radiographer, for general surgery, may overlook a foreign body in the eye; and how the absence of pain or movement upon use of the magnet is no proof that a magnetic foreign body is not present. The great point for this oculist is the location of the foreign body, intra- or extra-ocular, which is of far greater importance than its size. Next, is the question of whether it is magnetic or not.

Radioscopic examination should precede radiographic. If a foreign body is seen, it may be extraorbital, in the lids, in the orbit or extraocular but moving with the eye. The latter requires an exact diagnosis, as most bodies moving with the eye are intraocular. If its movements are the same as that of the cornea, it is in the anterior hemisphere of the eye; if in the opposite direction, it is in the posterior. In those very rare cases when the foreign body is at the exact center of rotation of the eye, it will not move, altho it is intraocular. In this case, unless it is absolutely round and very small, its dimensions change with the movements of the eye.

A negative radioscopic examination does not prove the absence of the foreign body, as it may be very small and obscured by the dark shadows from a bone. Then two radiographs must be taken, one frontal with the face towards the plate, the other lateral, with the suspected side towards the plate. If a careful examination of these show nothing, it may be concluded that no body visible by X-rays is present. If the shadow of a foreign body is seen, in such a position that it is clearly intraorbital, two supplementary plates must be made; some times four; two in a lateral position, one or two in a frontal.

In the lateral position, the head is inclined so that the injured orbit is projected on a plane interior to that of the other side, the normal rays falling at the level of the root of the nose. While the head is immovable, two exposures are made, one with the wounded eye looking up, and the other looking down. These with the others are usually sufficient for diagnosis. But if it is suspected that the body is in an ocular muscle, two frontal exposures must be taken, with the patient looking ahead and inward.

C. L.

J. G. Forbes. Conjunctival Filaria in Man. Lancet, Apr. 19, p. 654.

Forbes reports two cases in which filaria conjunctivae (Addario) were found. In one case the lesion was in the upper part of the left forearm and resembled a lymphatic gland. A thread-like worm was found in the abscess, and upon examination proved to be a male filaria conjunctivae. This is the first case reported in which the male organism was present. In all other cases hitherto reported, the female worm produced the disease.

The author reported a second case with tumor on the right side of the nose, which when opened was found to be a cyst that contained a female filaria conjunctivae of Addario measuring 94 mm. in length.

W. C. F.

American Journal of Ophthalmology

Series 3, Vol. 2, No. 8 August, 1919

PUBLISHED MONTHLY BY THE OPHTHALMIC PUBLISHING COMPANY

EDITORIAL STAFF

ADOLF ALT,
Metropolitan Bldg., St. Louis, Mo.
M. URIBE-TRONCOSO,
143 W. 92nd St., New York City.
MEYER WIENER,
Carleton Bldg., St. Louis, Mo.
CASEY A. WOOD,
7 W. Madison St., Chicago, Ill.
HARRY V. WÜRDEMANN,
Cobb Bldg., Seattle, Washington.
EDWARD JACKSON, *Editor*,
318 Majestic Bldg., Denver, Colo.
CLARENCE LOEB, *Associate Editor*,
25 E. Washington St., Chicago, Ill.

Original papers and books for review may be sent to any member of the editorial staff. Reports of society proceedings, correspondence, and other scientific communications should be addressed to the Editor.

Proof should be corrected and returned within forty-eight hours to the printer. Reprints may be obtained from the printers, Tucker-Kenworthy Co., 501 S. La Salle St., Chicago, Ill., if ordered at the time proofs are returned.

Subscriptions, applications for single copies, communications with reference to advertising or other business, should be addressed to
H. A. FOX, Manager, 7 West Madison St., Chicago, Ill.

CHOROIDEREMIA.

Absence of the choroid is such a striking condition, and of such important interest in ocular physiology and pathology, that it deserves to be better known. As indicated in Dr. Connor's paper, (p. 553) the literature relating to it is very scanty. Beside the sentence he quotes from de Schweinitz' last edition, no allusion to it has been found in any American textbook.

Among English books, Parsons[1] mentions it in two lines; and the only fairly adequate account is by Collins and Mayou,[2] based on the article by Nettleship. In the Graefe-Saemisch Handbuch, Leber[3] seems to have disposed of the subject by classifying the reported cases as pigmentary degeneration of the retina with extreme atrophy of the choroid. Fuchs, Axenfeld, Roemer and Adam in their books make no allusion to it. It is mentioned in none of the atlases on ophthalmoscopy. Apparently the first colored plate representing the appearances noted is the one published in this number of this journal.

The first case was reported in 1872 by Mauthner.[4] Two years later Koenig[5] reported two cases, one seen in Schirmer's clinic at Greifswald, and the patient's younger brother. In 1892 Cowgill[6] of Paducah, Kentucky, published a case he had seen six years before. Tatham Thompson[7] of Cardiff, Wales, published his case in 1899, and Otto Landman[8] of Toledo, Ohio, reported his case with a discussion of the probable origin of such a condition in 1905. In 1908 Nettleship[9] in his paper on "Retinitis Pigmentosa and Allied Diseases," brought together the reported cases, with two others that seem to be of somewhat different character, scarcely justifying their inclusion in this group.

The patients have all been males. Generally they were young men when they came under observation; but the completely bilateral character of the condition, the clear history of the defective sight from early childhood, without change, and absence of any especial sickness to which it could be ascribed point unmistakably to its congenital origin. Nettleship describes it under the heading "Congenital Absence of the Choroid." No consanguinity of parents has been reported. One brother of Mauthner's patient was said to have similar defects of vision. A great uncle of Thompson's patient suffered from night blindness. This latter patient and also Koenig's patients had brothers and sisters with apparently normal sight.

Night blindness or lack of retinal adaptation is mentioned by all these authors except Cowgill. All the patients knew their vision was defective, and all showed concentric contraction of the visual fields. With the ophthalmoscope the media were found clear, the choroid absent over most of the fundus, but present in the region of the macula; and the retinal vessels approaching normal. Scattered pigment spots were noticed in different parts of the fundus, tho Thompson's sketch shows but one.

The patch of choroid present, varying in size from 1 to 3 disc diameters, was not peculiarly pigmented, and had always an indefinite border, in contrast to the sharp boundary seen in cases of choroidal coloboma. In some cases the macular patch of choroid was nourished by vessels arising at or near the disc, in others these were not present. Isolated choroidal vessels were sometimes seen in other parts of the fundus, and Landman sketched what he regarded as rudimentary vortex veins.

The physiologic importance of the choroid makes it almost inconceivable that a large part of it should be lacking in an eye possessed of standard vision in good daylight. But this anomaly has now been so well described by so many observers, and their descriptions agree so completely in all important features, that we must regard choroideremia as a well-established, altho very rare, anomaly of the eye. No case has yet been examined postmortem and none have been encountered in the examinations of enucleated eyes that have added so much to our knowledge of the more common anomalies of the anterior portions of the retina and uveal tract.

Every case of this condition should be carefully studied, not only as to visual acuity and fields of vision, but also with reference to retinal adaptation, tension of the eyeball, and departures of the anterior portions of the uveal tract from normal standards; and anomalies of pupil, and accomodation. The life history of every eye so departing from normal structure would be interesting. Its reaction to injury or infection, its liability to vitreous opacity, cataract and other nutritive disorders would be of interest. It is also pertinent to inquire how often any similar anomaly is encountered in the lower animals.

E. J.

REFERENCES.

1. Parsons, J. H. The Pathology of the Eye. v. III, p. 825.
2. Collins and Mayou. Pathology and Bacteriology. p. 84.
3. Leber. Graefe-Saemisch Handbuch. 2nd edition. Disease of the Retina, p. 1185.
4. Mauthner. Berichte des Naturwissenschaftlich-Medizinschen Verein. Yr. 2, p. 191.
5. Koenig. Inaug. Dissert, p. 17.
6. Cowgill, W. M. A Case of Binocular Absence of the Choroid. Arch. of Ophth., v. 21, p. 105.
7. Thompson, T. Trans. Ophth. Soc. United Kingdom, v. 19, p. 140.
8. Landman, O. Congenital Absence of Choroid and Retina, Arch. of Ophth., v. 34, p. 473.
9. Nettleship, E. Retinitis Pigmentosa and Allied Diseases. Royal London Ophth. Hosp. Reports, v. 17, p. 333.

OPHTHALMIC EXAMINATIONS.

In the last five years three important movements have arisen in the profession for the determination and recognition of special competence by examinations open to graduates in medicine. The state examinations for the license to practice were always designed to enforce a certain minimum standard of requirement, falling below which a candidate should not be permitted to practice. These new examinations are intended to ascertain if the candidate has attained a somewhat higher standard of competence.

The examinations referred to are those of the National Board of Medical Examiners, the American College of Surgeons, and the American Board for Ophthalmic Examinations. The first was designed to furnish evidence of fitness for practice that could be accepted by all the government medical services, and state boards of medical examiners, without requiring a separate examination for each service or state. Such evidence is sought mainly by written and practical examinations extending over several days, modeled a good deal on the plan of the "Conjoint Board" examinations of Great Britain, and familiar in American Colleges and Universities.

The American College of Surgeons was largely designed to raise the ethical as well as the educational standard of the surgeons of America; and to effect that purpose, various committees and individuals have been called upon to certify to the professional character of applicants, while their technical training and skill is passed upon largely by means of case reports, the genuineness of which can be verified by reference to hospital records. Before putting this plan into operation the college was formed by invitation of surgeons upon their general reputation and professional standing, and in this way mistakes were made that have been a serious embarrassment to the organization.

The American Board for Ophthalmic Examinations was neither self constituted nor brought into existence by a general invitation to men of supposed good professional standing. Its members were chosen by the three national organizations, the American Ophthalmological Society, the Section on Ophthalmology of the American Medical Association, and the American Academy of Ophthalmology and Oto-Laryngology, by the same methods as these organizations choose their presiding officers. Its purpose is primarily to ascertain who are properly prepared for ophthalmic practice, altho it also recognizes responsibility not to certify the fitness of those guilty of gross professional misconduct. It gives no academic degree and grants no legal right to practice, but its certificate is already coming to be recognized as an evidence of training for ophthalmic practice, on which the medical profession and the public can rely. After next year it will be required for admission to membership in the American Ophthalmological Society and the Academy.

In determining who should be given its certificate the Board decided it should be restricted to those who made formal application, after careful examination of their claims of qualification submitted, and that this examination should be made on broad lines. There is no more searching written examination than the writing of a book, or a series of scientific papers, to be judged by reviewers, rival authors, teachers, students and practitioners. There is no more conclusive form of oral examination than that of lecturing, quizzing students and taking part in the discussions of medical societies. No better practical examination can be devised than conducting a public clinic in the presence of students and colleagues. Where these tests have been passed successfully, and the general verdict of the profession is known, the Board for Ophthalmic Examinations has accepted the verdict, and on the examination of such evidence has granted its certificate.

But there are many well educated ophthalmologists who have never submitted themselves to the public examinations above referred to, whose fitness for ophthalmic practice is just as important to the public and the medical profession as that of the writers and chiefs of clinics. It is especially to ascertain and certify their fitness that the Board was instituted. To accomplish this the plan of case reports has been adopted. The man who can thoroly examine a case and reach a correct diagnosis, can make a record of what he finds and the conclusions he draws therefrom; and such a record will enable any skilled ophthalmologist to draw fairly safe conclusions with regard to the professional abilities of its author, especially when supplemented by the examinations which bring the candidate in personal touch with the examiners.

These additional examinations by the Board are oral, practical and written. The oral and practical are largely simultaneous. In the laboratory the candidate examines the prepared slides and tells what he sees in them, the significance of the appearances found, and what conclusions he draws from his observations. In the clinical portion he examines the patient, tells what symptoms he discovers, and is crossquestioned as to his methods of examination, and the diagnosis and treatment that can be based upon the facts brought out. The written part of the examination is planned to develop the basis of fundamental knowledge that the applicant brings to his practical study of cases, that will enable him to get a broad comprehensive view of the conditions presented.

The questions for the last written examination of the American Board for Ophthalmic Examinations were as follows:

1 Describe the development of the crytalline lens.
2. Draw a diagram of a vertical cross-section of the middle of the upper lid, indicating the structures and their relations.
3. What change takes place in the iris in the act of accommodation; what effect does it have on vision?
4. Describe the repair of corneal tissue after its destruction by corneal ulcer.
5. A patient with uveitis develops increased tension of the eyeball, with severe pain and loss of vision. How would you manage the case?

It is natural on reading of such examinations to inquire how one would answer such questions himself. Generally there is a feeling that the fundamental branches studied long ago have been forgotten, and would prove the chief stumbling block. But the danger of this has been duly considered by the Board and failures to pass these examinations have not usually been on account of lack of training in physiologic optics, or anatomy, or inability to recognize a section of sarcoma of the choroid, or inflamed cornea. They have been more commonly due to inability to take a field of vision by any one standard method, or to recognize disease with the ophthalmoscope; or to the knowing of but a single routine method of measuring the refraction of an eye, or to incomplete mastery of even that. They have been due to weak points in the *practical* training for ophthalmic practice.

Sometimes the applicant would be well trained in most directions, but utterly incompetent to use a certain necessary method for diagnosis, or to manage a certain class of cases. When he was made aware of this, and set himself to make good the defects of his earlier training, he became a better ophthalmologist, a safer adviser for his patients, a more worthy and more successful member of his profession.

The drawing of the distinction between the ophthalmologists of America who are fairly prepared for their work, and those who are not, is a proper function of the Board of Ophthalmic Examinations. But a far more important work will be accomplished by arousing all ophthalmologists to compare their own training with a standard or an ideal course; and by stimulating them to discover in what they are deficient, and to seek the remedy for their deficiencies.

There are reasons and need for enormous improvement in the graduate teaching of Ophthalmology in this country. Paris and London are taking important steps to increase the efficiency of such teaching; and to draw to themselves students who cross the seas. But in certain important respects American methods of opthalmic practice are better than those current in Europe. The opportunities and quality of teaching should be equally good here. here.

The mass of those who treat the eyes of Americans will be trained in America. They must be as well trained as the mass of ophthalmologists in the old world. As our profession comes to understand what a good school of ophthalmology is, and the need for it, and proceeds to make its influence felt on the laity, the schools we need will be forthcoming. The American Board for Ophthalmic Examinations is one means for making our needs felt.

As was pointed out in the reports made by its members of the Board to the Section on Ophthalmology of the A. M. A., after next year the American Ophthalmological Society and the American Academy of Ophthalmology and Oto-Laryngology will require the certificate of the Board for admission to membership. It is also proposed next year to cease awarding the certificate on any examination that does not at least include the submission of case reports.

In the beginning there were older members of the profession whose published records were a sufficient basis for deciding their fitness for the certificate. Now, and in the next year, these will have had their opportunity to apply for such recognition. It is fair to suppose that if they have not done so, in the first five years of this effort on the part of ophthalmologists to raise their standard of training, that they do not care to lend their names to assist in the movement, or to ally themselves with the body that will be more and more the regular ophthalmic profession of the future. It seems proper, therefore, at this time to establish the single gateway of admission to such recognition.

Prompt application for examination will give material assistance to the new movement, and still give applicants the benefit, if benefit it be, of having their past work recognized in the examination. But all who are awake to the changes going on about them must recognize that this is a period of transition; and in the future, men will be more thoroly and systematically trained for ophthalmic practice; and the general profession and the public will be more exacting with regard to evidences of good training.

E. J.

THE OSLER ANNIVERSARY.

On July 12th of this year occurred the seventieth anniversary of the birth of Sir William Osler. With cordial enthusiasm members of the English speaking medical profession united to do him honor in a memorial volume that developed so that it had to be divided. The original papers announced to appear therein number 139, representing every department of medicine.

Sir William has not been especially connected with the field of ophthalmology. But his service in the Royal London Ophthalmic Hospital placed him in the class with Albutt, Hughlings Jackson, Jonathan Hutchinson and Sir Wm. Gowers, of those whose acquaintance with the exactness of methods of ophthalmic diagnosis has contributed to their eminence in other fields of medicine and surgery.

In view of Osler's catholic interest in all that pertains to medical science, it is appropriate that the memorial volume should contain papers relating to ophthalmology. There are five of these all by American writers, as follows:

Oxycephaly and Exophthalmos, by George Dock, of St. Louis, an internist.

The Schematic Drawing of the Eye in Its Historic Development, by the late Mortimer Frank, of Chicago.

Visual Disturbances of Polycythemia Vera, by Harry Friedenwald of Baltimore.

Description of Minute Sarcoma, with Histologic Findings, by John E. Weeks, of New York.

Eyes of the Burrowing Owl, Special

Reference to the Fundus Oculi, by Casey A. Wood, of Chicago.

Chronic Tuberculosis of the Choroid, by Edward Jackson, of Denver.

From his colleagues and admirers among American ophthalmologists, we offer sincere congratulations and good wishes; with the hope that he will live up to his centenarian family history; and long continue the active, progressive, wise leader that he is to the medical profession.

E. J.

BOOK NOTICES.

Squibbs Materia Medica. 1919 Edition. Published by E. R. Squibb & Sons, New York (gratuitous).

This is an exhaustive series of formulas and descriptions of the products gotten out by this well-known pharmaceutical house. The occasion of its publication is the one-hundredth birthday anniversary of the late Dr. E. R. Squibb, the founder of the house; and the sixtieth anniversary of its foundation. This little book is useful for reference; more so perhaps to the ophthalmologist than to some of his professional colleagues, who are habitually prescribing a wide range of drugs for internal use.

H. V. W.

The Refraction of the Eye. A Manual for Students. By **Gustavus Hartridge,** F. R. C. S. Sixteenth Edition. (See also p. 546.)

The fact that this little book has run sixteen editions from the time of its first publication in 1884, bespeaks its popularity and something of its value. The size of the book has remained about the same, the present edition being 281 pages, including the index. The author has, from time to time, condensed portions and included newer methods.

In this last edition will be found the broken ring test chart of Landolt; newer references to the shadow test, which the English call Retinoscopy and brief notes on heterophoria, which, with its subdivisions, now seems to be accepted by our English cousins as a proper nomenclature. We note that "cyclophoria is only occasionally met with in this country, tho cases seem frequently to occur in America." Also that asthenopia is sometimes due to diseased teeth. In other respects this edition is like the previous ones, discussing the subject of refraction in a personal way that makes easy reading for the student.

For the sixteenth time we recommend this book for teaching purposes and as a vade mecum for the refractionist. H. V. W.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C. Volunteers are needed in other localities.

DEATHS.

Dr. F. K. Brown died in Philadelphia on May 31st.

Dr. C. B. Bush died in Philadelphia on May 27th.

Walter T. Clegg, of Liverpool, died suddenly of pneumonia, at the age of sixty years.

L. E. Desjardins, a professor in Laval Medical College, Montreal, died recently.

Dr. William M. Floyd, of Henderson, Kentucky, died on May 17th.

Dr. Hiram L. Lutz, of Philadelphia, died on June 8th.

Erik Nordenson, of Stockholm, died last February of influenza in his 72nd year.

Arthur Brigham Norton, New York City, for ten years the editor of the Homeopathic Eye, Ear and Throat Journal; died at his home, June 18th, from pneumonia.

Henry Simon Oppenheimer, New York City, aged 75; a member of the American Ophthalmological Society; Ophthalmologist to the Montefiore Home; died at his home, July 5th.

H. E. Pagenstecher, of Strassburg, died recently.

Dr. L. M. Palmer died in Boston on June 4th.

H. Schöler, of Berlin, died recently.

Dr. H. F. Stowell, of Rochester, New York, aged 71, died at his home on June 8th, from senile debility.

Henry G. S. Warren died recently in Sydney, Australia.

The friends of Dr. A. E. Bulson in the medical profession extend to him their deep sympathy and regret at the death of his wife, Eva Maud Bulson. Mrs. Bulson died of heart disease in their home at Fort Wayne, Indiana, on June 25, 1919.

PERSONALS.

Dr. Chas. A. Bahn has been elected assistant professor of Diseases of the Eye in the Graduate School of Medicine, Tulane University; and first assistant surgeon in the Eye Department of the Eye, Ear, Nose and Throat Hospital of New Orleans.

Charles H. Baker, of Bay City, was elected president of the Michigan State Medical Society at its 54th annual meeting.

At the annual meeting of the Southwest Kentucky Medical Association held at Paducah, Kentucky, May 22nd, Dr. H. G. Reynolds was elected president for the ensuing year.

Acting Assistant Surgeon F. B. Eaton, U. S. Public Health Service, has been ordered to proceed from San Francisco, California, to Lexington, Kentucky, and to continue his investigations as to the etiology of trachoma in Kentucky and the Appalachian region.

Dr. A. C. Bartholomew announces his return to civil practice, with offices in the Home Guards Temple, Van Wert, Ohio.

Dr. E. A. Codman announces that he has returned to civil practice at 227 Beacon Street, Boston.

Dr. Arthur M. Yudkin, announces that he will be located at 238 York Street, New Haven, Connecticut, for the exclusive practice of the diseases of the eye, ear, nose and throat.

Dr. Harry Vanderbilt Würdemann, recently released from Army Service, and Dr. Harry Francis Macbeth will be associated in practice after June 1, 1919, at 708-710 Cobb Building, Seattle.

Dr. Samuel D. Risley of Philadelphia expects to spend the month of August at Bear Lake, Luzerne County, Pennsylvania.

Dr. T. B. Holloway, secretary of the American Ophthalmological Society, has been elected Surgeon to Wills Eye Hospital, Philadelphia, to succeed Dr. Wm. M. Sweet, who recently resigned. Dr. Sweet will continue his present work as Assistant Surgeon to Jefferson Medical College, Philadelphia. Dr. Holloway expects to leave the city about August 1st for a trip to Canada.

Colonel Casey A. Wood has been engaged during the summer on his Encyclopedia of Ophthalmology and the Anniversary Volume in honor of Sir William Osler and expects shortly to take up the preparation of the Base Hospital Section of our Medical and Surgical History of the War. He will remain in California until October 1st after which he will return to Washington for the purpose just mentioned.

Dr. A. C. Seely of Roseburg, Oregon, has returned from the Service and resumed his practice.

Dr. Calvin C. Rush of Christian College, Canton, China, is now located at Mountain View, California.

Dr. Robert I. Bullard of Springfield, Illinois, has recently returned from overseas service.

Captain E. C. Spitze has been discharged from the Army service and has resumed his practice in the Murphy Building, East St. Louis, Illinois.

Dr. Ralph T. Merrill has received his discharge from the Army and has opened his office in Idaho Falls, Idaho.

Dr. James A. Morgan is relieved from active duty in the Naval Medical Corps at the U. S. Naval Hospital, Mare Island, California, and is resuming his practice at Honolulu.

Dr. Harry V. Würdemann of Seattle has been commissioned Major M. R. C. He recently served as chief of the Eye, Ear, Nose and Throat Section, Base Hospital, Camp Lewis, Washington.

Dr. Vard H. Hulen of San Francisco, California, has received his discharge from the Army and has returned from France. We had the pleasure of seeing Dr. Hulen in Denver on his way home. He was looking very fit after his military experience.

Dr. G. I. Hogue has returned after a two years service with the A. E. F., and will resume his practice at 410 Jefferson St., Milwaukee.

SOCIETIES.

In the meeting 3rd of May, 1919, of the Norwegian Society of Science in Christiania the Fridtjof Nansen Prize—Kr. 2000—was awarded to Hj. Schiötz and S. Holth for important work on glaucoma.

The Tenth Annual Meeting of the Oxford Ophthalmological Congress took place July 11, 1919, with the following officers: Sidney Stephenson, master; Philip H. Adams, deputy master; Sir Anderson Chritchett, honorary treasurer; A. Bernard Cridland, honorary secretary.

At the annual meeting of the Kansas City Eye, Ear, Nose and Throat Club the following officers were elected: President, Dr. Hal

Foster, Kansas City; vice-presidents, Drs. John D. Pifer, Joplin, and Theodore S. Blakesley, Kansas City.

At the recent meeting of the American Medical Association, Section on Ophthalmology, the following special committee was appointed to cooperate with committees from other societies for the purpose of considering the advisability of arranging for the International Congress of Ophthalmology to be held in the United States. It was recommended that these committees be appointed: A committee of three to report to the section on the standardizing of undergraduate instruction of ophthalmology; a committee of three to report a scale of compensation for ocular injuries, and a committee of five to report on the use of various local anesthetics and on their effects on the eye.

During the meeting of the American Medical Association, the Air Service Medical Association of the United States was formed with the following officers: President, Col. John O. McReynolds, Dallas, Texas; first vice-president, Col. Theodore C. Lyster, Rockefeller Institute, New York City; second vice-president, Col. Eugene R. Lewis, Dubuque, Iowa; third vice-president, Col. Isaac H. Jones, Philadelphia, Pa.; fourth vice-president, Col. William H. Wilmer, Washington, D. C.; fifth vice-president, Col. Albert E. Truby, Washington, D. C.; secretary, Major John P. Gallager, Philadelphia, Pa.; council, Major James H. McKee, Philadelphia, Pa.; Major Frank Cary, Chicago, Ill.; Captain David H. Webster, New York City; Col. Casey A. Wood, Chicago, Ill.; Lt. Col. W. L. Sheep, Washington, D. C.; historian, Major E. C. Schneider, Mineola, Long Island, N. Y.; treasurer, Major Robert S. McCombs, Philadelphia, Pa.

The Philadelphia Medical Club, at its June reception, which was held in the ball room of the Bellevue Stratford Hotel, had as its guests of honor Senator Robert L. Owen of Oklahoma and the following foreign delegates to the American Medical Association: England — Lieut. Col. Sir Shirley Murphy, Sir Arbuthnot Lane, Rear Admiral E. R. Dimsey, Major W. Hey Groves, Sir St. Clair Thomson, Lieut. Col. Arthur F. Hurst, Dr. A. Graham Little. France—Professor P. Begouin and Professor R. Picqué, of Bordeaux, Major F. LeMaitre of Paris. Belgium—Professor Antoine DePage, Captain Van de Velde. China—Major S. T. Lee. Japan—Dr. S. Uchino.

Addresses of welcome were made by Dr. G. Oram Ring, president of the Club, and by Col. Edward Martin, Commissioner of Health of Pennsylvania, representing Governor Wm. C. Sproul. Responses were made by Sir St. Clair Thomson for England, Professor Le Maitre for France, and Senator Owen for America. A dinner to the guests of honor at the Union League by Dr. Ring preceded the reception.

MISCELLANEOUS.

We hope shortly to publish a complete list of the ophthalmologists in the Reserve Corps, with their active M. C. and inactive ranks.

Dr. Edward Van Cleve of New York states that forty-four state, private, and public school classes for the blind in ten cities of the United States enroll about 6,000 pupils.

Through the efforts of Dr. Jacob Bolotin, a blind heart and lung specialist of Chicago, a massage class has been organized consisting of six men and two women, selected from a large group of blind people.

The I. C. Railroad Hospital at Paducah, Kentucky, with an especially equipped operating room for eye, ear, nose and throat, and built at an expense of three hundred thousand dollars, will be completed about August first.

Dr. Frank Allport and Dr. James R. Smith of Chicago have had Hardy and Company make a very simple pair of spectacles for the detection of malingering. It consists in a plano lens on one side and a strong convex lens on the other. The frame has straight temples and a reversible nose piece.

The Court of Appeals of Kentucky reverses a judgment that affirmed an award of the Compensation Board for the loss of an eyeball the same as for the loss of sight of one eye. The Court considers that the loss of the eyeball is greater than the loss of sight of an eye and is entitled to more compensation.

Volume 1, Number 1, of Better Eyesight, edited by Dr. W. H. Bates of New York, is on our desk. Words fail us when an attempt is made to comment upon it. It is probable that it will have a following and that its teachings will find a receptive soil among people who dislike to wear glasses; but we are at a loss to understand upon what scientific basis an excuse for its existence can be offered.

An editorial in a recent number of the New York Medical Journal emphasizes to the medical profession at large the importance of recognizing the intimate relationship of ophthalmology to internal medicine. The article was inspired by listening to some papers which were read in the Ophthalmic Section of the Atlantic City meeting of the A. M. A.

The report of the Illinois Society for the Prevention of Blindness for February, March, April and May, shows that three doctors and one midwife were brought to trial for failure to report infection of the eyes of infants. Thirty-eight cases of ophthalmia neonatorum were reported to the Society. Twelve of these cases were referred to the Visiting Nurses' Association, twelve were taken to hospitals and two to a dispensary. Sixty-three cases of school-children with defective vision were referred to the Society. In fifty-one cases payment for glasses was made from the Lois Maxine Adler Fund. Twenty-eight other cases were referred to the Society with various eye defects.

OPHTHALMIC LITERATURE

These lists contain the titles of all papers bearing on Ophthalmology received within the preceeding month. These titles are all in English, some of them modified to indicate more clearly their subjects. These subjects are grouped under appropriate heads, the succession of groups being the same from month to month. In the group the papers are arranged alphabetically usually by the name of the author in heavy-face type. After the subject of the paper (Ill.) indicates the number of illustrations. (Pl.) the number of plates, and (Col. pl.) colored plates illustrating the article. (Abst.) shows that it is an abstract of the original article. (Bibl.) tells that the paper is accompanied by an important bibliography. (Dis.) means that a discussion of the subject is published with it. Under Repeated Titles are indicated additional publication of papers already noticed. To secure the earliest possible notice writers may send copies of their papers, or reprints, to 318 Majestic Bldg., Denver, Colorado.

DIAGNOSIS.

Allport, F., and Smith, J. R. A Trial Frame for Eye Malingering. Jour. Amer. Med. Assn., v. 73, p. 105.

Berger, E. A New Model of My Binocular Loupe. (1 ill.) Woch. f. Therap. u. Hyg. des Auges, v. 20, pp. 69-70.

Birch-Hirschfeld. The Five-Point Adaptometer. (2 ill.) Zeitschr. f. Ophthal. Optik, v. 5, pp. 44-49.

Bjerke, K. Optotypes Reduced in Size for Detection of Malingering. (2 ill.) Zeitschr. f. Ophthal. Optik, v. 5, pp. 55-61.

Brailey, A. R. Examinations of Aviators. (Dis.) Amer. Jour. Ophth., v. 2, pp. 433-434.

Henker, O. Instruments for Examining Fundus of Eye. (12 ill.) Zeitschr. f. Ophth. Optik, v. 2, pp. 160-169.

Ophthalmic Examining Instruments. (18 ill.) Zeitschr. f. Ophth. Optik, v. 3, pp. 83-90, 120-122; v. 4, 122-124, 154-160, 187-189.

Simple Test Case of Telescopic Lenses. (4 ill.) Zeitschr. f. Ophth. Optik, v. 4, pp. 43-59.

Henker, O., and Mühsam, W. Pupilometer, Instrument for Ascertaining Pupillary Distance. Zeitschr. f. Ophth. Optik, v. 5, pp. 162-167.

Koeppe, L. The Gullstrand-Nernst Slit Lamp. Limits of Use. (4 ill.) Zeitschr. f. Ophth. Optik, v. 6, pp. 121-140.

Test Types for the Illiterate. Brit. Med. Jour., v. 3, pp. 257-258.

Vogt, A. Further Ophthalmoscopic Observations with Red-free Light. Korresp.-bl. f. Schweiz. Aerzte, No. 18.

Weiss, K. E. Visual Tests. Woch. f. Therap. u. Hyg. des Auges, v. 21, pp. 21-22.

Wolffberg. Diagnostic Visual Tests. (1 ill.) Woch. f. Therap. u. Hyg. des Auges, v. 18, pp. 159-160.

THERAPEUTICS.

Chevalier. Collargol in Ocular Diseases. (Bibl.) Clin. Ophtal., v. 8, pp. 257-272.

Fürstenau. The Effect of Trypaflavin upon Pathogenic Germs of the Eye. (Bibl.) Zeitschr. f. Augenh., v. 40, pp. 1-22.

Hoff-Markirch. Homatropin Eye Compresses. Woch. f. Therap. u. Hyg. des Auges, v. 20, p. 53.

Lawson, A. Flavine in Ophthalmic Surgery. Lancet, June 28, 1919, v. 196, p. 1112.

Onate, A. F. Cocain in Eye, Ear, Nose, and Throat Work. Rev. d. med. y. cir. Habaña, v. 23, p. 585.

Piesbergen, F., and Weiss, K. E. Strychnin in Ophthalmology. Woch. f. Therap. u. Hyg. des Auges, v. 20, p. 174.

Wolffberg. Dionin in Ophthalmology. Woch. f. Therap. u. Hyg. des Auges, v. 21, pp. 81-85.

Ocular Dressings. Woch. f. Therap. u. Hyg. des Auges, v. 21, pp. 209-210.

Therapeutic Significance of Glycerin-Tragacanth-Jelly. Woch. f. Therap. u. Hyg. des Auges, v. 19, pp. 61-63.

Repeated Titles. **Gradle** (v. 2, p. 305). Brit. Jour. Ophth., v. 3, p. 275.

OPERATIONS.

Ansenn. Treatment of Wounds by Deep Antisepsis with Bichlorhydrate of Isoethylhydrocuprein. München med. Woch., 1918, No. 20. Abst. in Clin. Ophtal., v. 8, pp. 279-280.

Hirsch, C. T. W. Anesthesia for Ophthalmic Operations. (1 ill.) Lancet, June 21, 1919, v. 196, p. 1068.

Kirkpatrick, H. Lamp for Operations. Brit. Jour. Ophth., v. 3, p. 285.

Lanier, L. H. Improved Technic in Important Eye Operations. Charlotte Med. Jour., v. 69, p. 105.

Pichler, A. Technic of the Magnetic Removal of Splinters. Zeitschr. f. Augenh., 1918, v. 40, pp. 30-33.

Seiz. An Aid for Small Eye Dressings. Woch. f. Therap. u. Hyg. des Auges, v. 20, p. 83.

Wolffberg. Unreliable Anesthesia. Woch. f. Therap. u. Hyg. des Auges, v. 21, p. 205.

REFRACTION.

Beckers. The Cause of Myopia. Deutsche ophth. Woch. Nos. 5 and 6, 1918. Abst., Clin. Ophtal., v. 8, pp. 296-298.

Big, Round, Spectacle Lenses. New York Med. Jour., v. 110, p. 112.

Boegehold, H. Correction of Astigmatism with Sphero-Toric Lenses. (15 ill.) Zeitschr. f. ophthal. Optik, v. 4, pp. 161-171.

Mathematic and Physiologic Differences of Strength of Sphero-Toric Lenses. (2 ill.) Zeitschr. f. ophth. Optik, v. 5, pp. 129-136; v. 6, pp. 61-64, 119-120.

Cilleruelo. Treatment of Convergent Strabismus in Children. Plus Ultra, v. 2, p. 18. Abst., Jour. Amer. Med. Assn., v. 72, p. 1946.

Clarke, E. Presbyopia. Amer. Jour. Ophth., v. 2, p. 437.

Craig, J. A. Homatropin Poisoning. Brit. Jour. Ophth., v. 3, pp. 250-251.

Dixey, W. A. New Form of Bifocal Lens. Brit. Jour. Ophth., v. 3, p. 285.

Erggelet, H. High Power Reading Glass for Myopes. Zeitschr. f. ophth. Optik. v. 4, pp. 149-153.

Incidence of Accommodation. (1 ill.) Zeitschr. f. ophth. Optik, v. 3, pp. 18-20.

Fisher, J. H. Migraine. Brit. Jour. Ophth., v. 3, pp. 241-244.

Fison, A. H. Focal Lines of Small Cylindirc Beam of Parallel Rays Traversing Center of a Double Convex Lens. (5 ill.) Brit. Jour. Ophth., v. 3, pp. 244-250.

Gradle, H. S. Ocular Discomfort at the "Movies." Jour. Amer. Med. Assn., v. 72, p. 1932.

Henker, O. Causes of Error in the Adjustment of Toric Lenses. (6 ill.) Zeitschr. f. ophthal. Optik, v. 5, pp. 13-23.

German Standard for Lenses. (Bibl.) Zeitschr. f. ophthal. Optik, v. 5, pp. 49-55.

Instrument to Demonstrate Accuracy of Ground Lenses. (6 ill.) Zeitschr. f. ophth. Optik, v. 4, pp. 172-183.

Measurement of Vision thru Good and Bad Lenses. (9 ill.) Zeitschr. f. ophth. Optik, v. 6, pp. 106-119.

Measure of Vertex Refraction. (6 ill.) Zeitschr. f. ophth. Optik, v. 3, pp. 21-32.

Proper Adjustment of Lenses and Their Fittings. Woch. f. Therap. u. Hyg. des Auges, v. 20, pp. 201-203, 209-211.

Reducing Inaccuracy in Adjusting Spectacle Lenses and Frames. (1 ill.) Zeitschr. f. ophth. Optik, v. 5, pp. 96-108.

Report of Committee on Standardization of Glasses and Their Fittings. (2 ill.) Zeitschr. f. ophth. Optik, v. 5, pp. 136-144.

Telescopic Glasses for Poor Vision. (5 ill.) Zeitschr. f. ophth. Optik, v. 4, pp. 12-21.

Kloth, G. Novelties in the Fittings of Glasses. (45 ill.) Zeitschr. f. ophth. Optik, v. 4, p. 61; v. 5, pp. 117-123, 145-148, 167-172; v. 6, pp. 22-24, 42-48, 64-68.

Kloth, G., and Henker, O. Novelties in the Fittings of Glasses. (5 ill.) Zeitschr. f. ophth. Optik, v. 2, pp. 170-177; v. 3, pp. 56-60, 83, 187-189; v. 5, pp. 26-28, 59-60.

Lundsgaard, K. K. K. Transient Myopia. Hospitalstidende, v. 62, p. 545. Abst. Jour. Amer. Med. Assn., v. 73, p. 158.

Marquez, D. M. The Real Mechanism of Skiascopy. (20 ill., bibl.) La Res. Med. Española Plus Ultra, 1919. 65 pages.

Meliwitz. Subconjunctival Injection of Salt in High Myopia. Klin. M. f. Augenh., v. 55, p. 365. Abst., Berlin klin. Wochenschr., v. 53, p. 486.

Menacho, M. Myopia. (Dis., 2 ill.) Arch. de Oftal. Hisp.-Amer., v. 19, pp. 233-301.

Pflugk, A. v., and Rohr, M. v. Evolution of the Knowledge of Lenses. Zeitschr. f. Augenh., 1918, v. 40, pp. 50-77.

Purtscher. Loss of Accommodation from the Use of Poppy Seeds. Centralb. f. prakt. Augenh., March-Apr., 1919, p. 48.

Rohr, M. v. Development of Shooting Glasses. Zeitschr. f. ophth. Optik, v. 4, pp. 22-26.

Novelties in the Fittings of Spectacles. (24 ill.) Zeitschr. f. ophth. Optik, v. 2, pp. 178-188; v. 3, pp. 52-56, 122-126, 183-187; v. 4, pp. 61-64, 183-187; v. 6, pp. 68-69, 90-96.

Resumé of Optical Work for the Years 1913 and 1914. (Bibl.) Zeitschr. f. ophth. Optik, v. 2, pp. 111-128.

Review of Optics to the End of 1916. Zeitschr. f. ophth. Optik, v. 5, pp. 83-92, 108-116.

Rijkens, R. G. Experiences with Glasses for Anisometropia. (1 ill.) Zeitschr. f. ophth. Optik, v. 4, pp. 146-149.

Schneider, C. O. Lenticular Lens for High Myopia. (6 ill.) Amer. Jour. Ophth., v. 2, p. 449.

Spanuth. Sphero-Toric Spectacles for High Myopia. (12 ill.) Zeitschr. f. ophth. Optik, v. 5, pp. 79-83.

Strebel. Accommodation in the Human Eye. Rev. Suisse de Med., July 20, Aug. 2, 1918. Abst., Ann. d'Ocul. (2 ill.), v. 156, pp. 310-312.

Weiss, E. Physiologic and Mathematic Differences of Meaning in Strength of Sphero-Toric Lenses. (8 ill.) Zeitschr. f. ophth. Optik, v. 5, pp. 153-162; v. 6, pp. 40-42, 88-90.

Wolffberg. Visual Acuity and Myopia. Woch. f. Therap. u. Hyg. des Auges, v. 19, pp. 181-182.

Ziegler, K. Cohn Theory of Overcoming Myopia Applied in Practice. Woch. f. Therap. u. Hyg. des Auges, v. 20, pp. 6-7.

Repeated Titles. **Stock** (v. 2, p. 305). Abst. Brit. Jour. Ophth., v. 3, p. 275.

OCULAR MOVEMENTS.

Beck, O. Central Nystagmus after Severe Asphyxia. Wien. med. Woch., v. 66, p. 445.

Cantonnet, A. Reëducation of Vision in Treatment of Strabismus. Presse Med., v. 27, No. 28.

Castresana, B. How Should Strabismus be Treated? España Oftal., v. 4, pp. 165-166.

Crossley, E. R. Double Paralysis of the External Recti Muscles. (Dis.) Amer. Jour. Ophth., v. 2, pp. 446-447.

Dunlap, K. The Nystagmus Test and Practice. Jour. Amer. Med. Assn., v. 73, pp. 54-55.

Eaton, E. M. Factors in Stereoscopic Vision. Brit. Jour. Ophth., v. 3, pp. 283-284.

Heydt, R. von der. Eye Muscle Imbalance. Illinois Med. Jour., v. 33, pp. 329-331.

Pichler, A. Simulated Strabismus. Zeitsch. f. Augenh., 1918, v. 40, pp. 157-163.

Riley, H. A. Conjugate Deviation of the Eyes. (1 ill.) Neurol. Bulletin, v. 2, pp. 181-189.

Sauvineau, C. Cerebral Origin of Strabismus and its Treatment by Lenses of Complementary Colors. Bull. de L'Acad. de Med., v. 81, pp. 789-791. Abst., Lancet, June 28, 1919, p. 1132.

Theobald, S. Correction of the Muscular Anomalies of the Eyes. Jour. Amer. Med. Assn., v. 72, pp. 1827-1828.

CONJUNCTIVA.

Cridland, A. B. Eczematous Kerato-Conjunctivitis. Birmingham Med. Rev., No. 474-5, p. 39. Abst., Arch. of Pediat., v. 35, p. 632.

Gallemaerts. Tuberculosis of the Bulbar Conjunctiva. Ann. d'Ocul., v. 156, pp. 295-297.

Guiral, R. Technic for Operative Treatment of Trachoma. Rev. de Med. y. Cir., v. 24, p. 235.

Hiwatari, K. Course of Trachoma and Normal Histology of the Conjunctiva. (Bibl.) Acta Scholae Med. Univ. Kioto, v. 3, pp. 31-48.

Krämer. Chronic Inflammation of Lids and Conjunctiva. Centralb. f. prakt. Augenh., March-Apr., 1919, p. 46.

McPherson, G., and Doyne, P. G. Artificially Produced Ophthalmia. Brit. Jour. Ophth., v. 3, pp. 313-315.

Neeper, E. R. Vernal Conjunctivitis. (Dis.) Amer. Jour. Ophth., v. 2, p. 443.

Neubner, H. Treatment of Conjunctival Inflammation following Enucleation. Centralb. f. prakt. Augenh., March-Apr., 1919, pp. 33-38.

Würdemann, H. V. Relative Scarcity of Trachoma on the Pacific Coast. Amer. Jour. Ophth., v. 2, pp. 455-456.

Repeated Titles. **Pacheco Luna.** (v. 2, p. 372.) Amer. Jour. Ophth., v. 2, p. 453. **Simon de Guilleuma.** (v. 2, p. 230.) Brit. Jour. Ophth., v. 3, p. 278.

CORNEA AND SCLERA.

Guist. Thinning of the Sclera with Necrosis and a Growing Staphyloma. Centralb. f. prakt. Augenh., March-Apr., 1919, pp. 47-48.

Müller, L. Total Leucoma of Right Eye and Absolute Glaucoma of the Left. (Dis.) Centralb. f. prakt. Augenh., March-Apr., 1919, pp. 45-46.

Rosenhauch, E. Optochin Treatment of Serpent Ulcer. Przegl. Lekarski No. 1, Jan., 1916, Abst., Deutsche med. Woch., v. 42, p. 523.

Schoute, G. J. Zonular Opacity of the Cornea. Zeitschr. f. Augenh., 1918, v. 40, pp. 167-169.

Sidler-Huguenin. Herpes of the Cornea. Corresp.-bl. f. Schweizer Aerzte, v. 49, p. 561.

Stilwill, H. R. Keratoconus. (Dis.) Amer. Jour. Ophth., v. 2, p. 443.

Uhthoff. Blue Sclera with Brittle Bones. Berl. klin. Wochenschr., v. 53, p. 488.

Wolffberg. Traumatic Recurrent Ulcer of Cornea. Woch. f. Therap. u. Hyg. des Auges, v. 22, pp. 2-3.

Repeated Titles. **Fuchs.** (v. 1, p. 749.) Brit. Jour. Ophth., v. 3, pp. 329-331. **Ourgaud.** (v. 2, p. 172.) Abst., Brit. Jour. Ophth., v. 3, p. 277.

ANTERIOR CHAMBER AND PUPIL.

Sarbo, A. v. The Pupil and its so called Paradoxic Light Reactions. Wien. klin. Wochenschr., v. 29, pp. 409-411.

UVEAL TRACT.

Clapp, A. B. Iritis. (Dis.) Jour. Amer. Inst. of Homeop., v. 12, pp. 69-72.

Collins, E. T., and Paton, L. Angioma of Choroid. Amer. Jour. Ophth., v. 2, p. 437.

Gordon, H. L. Eye Color and Abnormal Palate in Neuroses and Psychoses. Lancet, July 5, 1919, v. 197, pp. 9-10.

Leiche, I. L. Iritis due to 3rd Molar Infection. Jour. Med. Soc. New Jersey, v. 16, p. 237.

Nelson, N. C. Gumma of the Iris. Amer. Jour. Ophth., v. 2, p. 445.

Paradies. Subcutaneous Strychnin Injection in Irido-Cyclitis. Woch. f. Therap. u. Hyg. des Auges., v. 20, pp. 33-34.

Purtscher. Inflammation of the Choroid. Centralb. f. prakt. Augenh., March-April, 1919, p. 48.

Repeated Titles. **Meller.** (v. 1, p. 749.) Abst., Brit. Jour. Ophth., v. 3, p. 260. **Weve.** (v. 1, p. 462.) Amer. Jour. Ophth., v. 2, p. 451.

SYMPATHETIC DISEASE.

Knapp, A. The Autotoxic Factor in sympathetic Ophthalmia. (Dis.) Jour. Amer. Med. Assn., v. 72, pp. 1897-1900.

GLAUCOMA.

Bourdeaux. Acute Glaucoma and Myopia. Clin. Ophtal., v. 8, pp. 276-279.

Desai, H. M. Congestive Glaucoma after use of Homatropin and Eserin. Brit. Jour., Ophth., v. 3, pp. 251-252.

Herbert. Glaucoma Operations. Amer. Jour. Ophth., v. 2, p. 432.

Kearney, J. A. Importance of the Early Detection of Glaucoma. New York Med. Jour., v. 110, pp. 11-13.

Koeppe, L. Early Diagnosis of Glaucoma with the Gullstrand Nernst Lamp. Zeitschr. f. Augenh., 1918, v. 40, pp. 138-150.

Müller, L. Total Leukoma of Right Eye and Absolute Glaucoma of Left. (Dis.) Centralb. f. prakt. Augenh., March-Apr., 1919, pp. 45-46.

Smith, P. On Tonometric Values. Brit. Jour. Ophth., v. 3, pp. 293-300.

Stieren, E. Iridotasis in Glaucoma. New Albany Med. Herald, v. 28, pp. 121-123.

Stilwill, H. R., and Black, M. Glaucoma Simplex. (Dis.) Amer. Jour. Ophth., v. 2, pp. 442-443.

Wesseley, K. von. Ocular Tension and the General Circulation. Arch. f. Augenh., v. 83, July, 1918, p. 99. Abst., Centralb. f. prakt. Augenh., March-Apr., 1919, p. 49.

Young, G. Double Sclerectomy for Glaucoma. Lancet, v. 21, p. 893, May 24, 1919. Amer. Jour. Ophth., v. 2, p. 432.

CRYSTALLINE LENS.

Bader, von. Relation of Tonometry to Senile Cataract Operations. Arch. f. Augenh., v. 83, July, 1918, p. 168. Abst., Centralbl. f. prakt. Augenh., March-Apr., 1919, p. 51.

Barraquer, I. Modern Methods of Cataract Extraction. España Oftal., v. 4, p. 165.

Berger, E. A. The Wood Chopper as a Cataract Operator. Woch. f. Therap. u. Hyg. des Auges, v. 21, p. 14.

Butler, T. H. Statistics of Cataract Extraction. Brit. Jour. Ophth., v. 3, pp. 317-325.

Francois, Le. Posterior Discision of the Crystalline Lens. Clin. Ophtal., v. 8, pp. 272-275.

Fresno, F. P. del. Extraction of Cataract in the Capsule. Prog. de la Clin., v. 7, p. 117. Abst., Jour. Amer. Med. Assn., v. 73, p. 151.

Horlacher, J. Examination of 166 Persons between 41 and 83 Years of Age with Regard to Lens Opacity. (14 ill.) Zeitschr. f. Augenh. 1918, v. 40, pp. 33-49.

Jackson, E., and Black, M. Calcareous Lens in Anterior Chamber. Amer. Jour. Ophth., v. 2, p. 445.

Jeremy, H. R. Cataract Following Thyroidectomy. Brit. Jour. Ophth., v. 3, pp. 315-317.

Salus, R. The Origin of Cataract. Zeitschr. f. Augenh., v. 40, pp. 23-40.

Tuto, R. Juvenile Cataract Operation. Arch. de Oft. Hisp-Amer., v. 17, 1917. Abst., Brit. Jour. Ophth., v. 3, p. 261.

Vogt, A. Relation of Senile Cataract to Heredity and Disease. Zeitschr. f. Augenh., 1918, v. 40, pp. 123-137.

Wirths. Lens Opacity from Copper within the Eye. Zeitschr. f. Augenh., 1918, v. 40, pp. 164-166.

Repeated Titles. **Terson.** (v. 2, p. 469.) Abst. Brit. Jour. Ophth., v. 3, p. 276.

VITREOUS HUMOR.

Schneider, C. O. Hemorrhage into the Vitreous. Amer. Jour. Ophth., v. 2, p. 446.

Woll, F. A. Dissection of the Hyaloid. (4 ill.) Wellsworth, v. 7, 109-110.

RETINA.

Bachstez, E. Fundus Findings in an Eye Injured by a Blow. Centralbl. f. prakt. Augenh., March-April, 1919, p. 47.

Bailliart, P. Hyper-tension of the Retinal Artery. Ann. d'Ocul., v. 156, pp. 297-304.

Collins, E. T. Abiotrophy of the Retinal Neuroepithelium or "Retinitis Pigmentosa." (Dis.) Lancet, v. 21, p. 893. Amer. Jour. Ophth., v. 2, pp. 431-432.

Eperon. Photometry. Ann. d'Ocul., v. 156, pp. 227-228.

Gonin, J. Anatomic Causes of Detachment of the Retina. (18 ill.) Ann. d'Ocul., v. 156, pp. 281-295.

Henderson, E. Bilateral Choroidoretinitis. Amer. Jour. Ophth., v. 2, p. 438.

Light Sense. Lancet, v. 197, pp. 73-74.

Lohman, von. The Teaching of Adaptation. Arch. f. Augenh., v. 83, July, 1918, p. 275. Centralbl. f. prakt. Augenh., March-April, 1919, p. 152.

Night Blindness. Brit. Jour. Ophth, v. 3, p. 258.

Wolffberg. The Diagnosis of Night Blindness. Woch. f. Therap. u. Hyg. des Auges., v. 20, pp. 1-4, 9-10, 13-14, 17-18, 29-31.

Repeated Titles. **Jocqs.** (v. 2, p. 231.) Brit. Jour. Ophth., v. 3, p. 278.

OPTIC NERVE.

Henneberg. Cervical Myelitis with Disease of the Optic Nerve and Motor Paralysis. (Dis.) Berl. klin. Wochenschr., v. 55, pp. 774-775.

Hirschberg, J. Socalled Fulminant Blindness. Centralbl. f. prakt. Augenh., March-Apr., 1919, pp. 38-41.

Pichler, A. Traumatic Choked Disc. Centralbl. f. prakt. Augenh., Jan.-Feb., 1919, p. 9-11.

Sherer, J. W. Neuroretinitis (Choked Disc) Sequel to Thyroid Extirpation. (Dis.) Jour. Amer. Med. Assn., v. 72, p. 1936.

VISUAL TRACTS AND CENTERS

Klarfeld, B. Homonymous Hemianopsia following a Shell Wound. (Dis.) Wien. klin. Wochenschr., v. 29, p. 535.

Weakley, A. L. Homonymous Hemianopsia Occurring in a Case of Malignant Malaria. Brit. Jour. Ophth., v. 3, pp. 300-302.

Whale, H. L. Pituitary Tumor Treated by Operation. (3 ill.) Lancet, July 5, 1919, v. 197, pp. 11-12.

Wolff, G. Congenital Word Blindness. Deutsch. med. Woch., v. 42, p. 496.

COLOR VISION.

Collins, G. L. Color Blindness. Indian Med. Gaz., v. 54, p. 150.

EYEBALL.

Eigler, C. O. Shrunken Eyeball Following Pneumonia. (Dis.) Amer. Jour. Ophth., v. 2, p. 444.

Hayden, A. A. Enucleation of the Eyeball under Local Anesthesia. (Dis.) Amer. Jour. Ophth., v. 2, pp. 447-449.

Marin Amat, M. Indications for and Technic of Enucleation. España Oftal., v. 4, pp. 163-165.

LACRIMAL APPARATUS.

Barreal, R. Chronic Fistulous Dacryocystitis and Acute Inflammatory Glaucoma. (Bibl.) España Oftal., v. 4, pp. 145-156.

Francis, C. H. The Management of Epiphora. Illinois Med. Jour., v. 33, pp. 325-327.

Kofler, K. Tuberculous Enlargement of the Lacrimal Sac. Wien. med. Woch., v. 66, pp. 666-667.

Mayer, O. Nasal Removal of Remnant of Tear Sac after Extirpation. Wiener med. Wochenschr., No. 17, v. 66, p. 670.

Piesbergen, F., and Weiss, K. E. Hydrogen Peroxide in Treatment of Suppuration of the Lacrimal Sac and Fistulae. Woch. f. Therap. u. Hyg. des Auges, v. 20, p. 173.

Strauss. Still's or Mikulicz's Disease. Med. Klinik, 1915, No. 21, p. 590. Abst., Zentralbl. f. Innere Med., v. 37, pp. 258-292.

LIDS.

Cramer. Substitute for Lower Lid Thru Raising and Displacement of the Orbital Content. Zeitschr. f. Augenh., 1918, v. 40, pp. 151-154.

Dufourmentel, L. Double Pedicled Flaps in Repair of Extensive Facial Wounds. Restauration Maxillo-faciale. 1918, IV, p. 44. Abst., Rev. of War Surgery and Med., v. 2, pp. 48-49.

Martyn, H. S. Case of Anomalous Innervation of the Levator Palpebrae Superioris (2 ill.) Brit. Jour. Ophth., v. 3, pp. 310-313.

Morax. Plastic Operations of the Orbital Region, Eyebrows and Eyelids. Med. Press, v. 107, p. 393.

Nelson, N. C. Xeroderma Pigmentosa. (Dis.) Amer. Jour. Ophth., v. 2, pp. 445-446.

Ombredanne, M. L. Facial Autoplasty. Bull. et Mem. Soc. de Chir. de Paris, v. 44, p. 592. Abst., Ann. of Otol, Rhinol. and Laryng., v. 28, pp. 211-212.

ORBIT.

Cruise, R. R. Contracted Sockets. (Dis.) Amer. Jour. Ophth., v. 2, p. 432.

Morax. Plastic Operations on the Orbital Region. Lancet. v. 21, p. 894. Amer. Jour. Ophth., v. 2, pp. 434-435.

Spicer, W. T. H. Injuries and Inflammatory Diseases Affecting the Orbit and Accessory Sinuses. (Dis.) Amer. Jour. Ophth., v. 2, pp. 438-442.

Repeated Titles. Calllaud. (v. 1, p. 221.) Abst. Brit. Jour. Ophth., v. 3, pp. 272-274.

PARASITES.

Gomes, P. Cysticercus in Eyeball. Ann Paulistas de Med. e Cirrurg., v. 10, p. 17. Abst., Jour. Amer. Med. Assn., v. 72, p. 1945.

TUMORS.

Gonzalez, G. Malignant Pterygium. Med. Ibera, v. 6, p. 1946. Abst., Jour. Amer. Med. Assn., v. 72, p. 1946.

Hirschberg, J. Sarcoma of the Choroid. Centralbl. f. prakt. Augenh., March-Apr., 1919, pp. 41-43.

Kümmel, von. Pulsating Angioma of the Orbit. Arch. f. Augenh., v. 83, July, 1918, p. 261. Abst., Centralbl. f. prakt. Augenh., March-Apr., 1919, p. 52.

Lecène, P. Malignant Myelocytoma of the Orbit. (3 ill., Bibl.) Ann. d'Ocul., v. 156, pp. 249-256.

Morax, V. Orbital and Cranial Myelocytoma. (4 ill.) Ann. d'Ocul., v. 156, pp. 256-264.

Speciale-Cirincione. Osteoma of Orbit. (Bibl., 9 ill.) Ann. di Ott. e Clin. Ocul., v. 1, p. 81. Abst., Brit. Jour. Ophth., v. 3, p. 265.

Thompson, H. M. Sarcoma of the Ciliary Body. Amer. Jour. Ophth., v. 2, p. 445.

Veasey, C. A. Melanotic Sarcoma of the Choroid. Northwest Med., v. 18, pp. 137-138.

INJURIES.

Carsten, P. Injuries of the Eye in War from Ink Pencils. (Bibl.) Woch. f. Therap. u. Hyg. des Auges., v. 20, pp. 213-214.

Chapman, V. A. Some Unusual Foreign Body Cases. Wisconsin Med. Jour., v. 18, pp. 9-14.

Fejer, J. Foreign Body in the Sclera. Wien med. Klin., v. 12, p. 352.

Halliday, J. C. Sweet's Method of Localizing Foreign Body in the Eye. Med. Jour. Australia, v. 1, p. 191.

Hoare, W. Two cases of Severe Injury to Eye. Med. Jour. Australia, May 17, 1919, p. 404.

Lemaitre, F., and Garmy, A. Extraction of Periorbital Foreign Bodies. (2 ill., 2 plates.) Ann. d'Ocul., 156, pp. 265-281.

Lister, and Hine, M. L. Evulsion of the Optic Nerve. Amer. Jour. Ophth., v. 2, p. 437.

McKeown, E. E. Steel in Anterior Chamber. (Dis.) Amer. Jour. Ophth., v. 2, p. 444.

Pichler, A. Luxation of One Eye, Tearing out of the Other by a Shot. Centralb. f. prakt. Augenh., Jan.-Feb., 1919, p. 6-9.

Procksch. Wound of the Eye by Glass from an Exploding Syphon. Centralbl. f. prakt. Augenh., March-Apr., 1919, pp. 46-47.

Wirths. Lens Opacity from Copper Within the Eye. Zeitschr. f. Augenh., 1918, v. 40, pp. 123-137.

Repeated Titles. **Frenkel.** (v. 1, p. 880.) Amer. Jour. Ophth., v. 2, p. 453.

GENERAL DISEASES.

Audibert, V., Netter, A., Lèreboullet, P., Hutinel, J. Lethargic Encephalitis. Bull. de la Soc. Med. des Hop., v. 43, p. 296, 300-302. Abst., Jour. Amer. Med. Assn., v. 73, p. 68.

Ayer, J. B. Encephalitis Lethargica. (7 ill.) Jour. Amer. Med. Assn., v. 73, pp. 5-12.

Barnet, T. S. Myasthenia Gravis. Jour. Mo. State Med. Assn., v. 16, p. 244.

Beck, O. Vestibular Irritation of the Eye in the Diagnosis of Tumor of the Pons. Wiener med. Wochenschr., No. 12, v. 66, p. 447.

Belin, Harry. Encephalitis Lethargica with Progressive Paralysis. Boston Med. and Surg. Jour., v. 180, p. 741.

Bergeron, P. N. Lethargic Encephalitis. Arch. of Neurol. and Psychiat., v. 2, pp. 141-143.

Burdsall, R. E. Recent Deaths in Ohio from Lethargic Encephalitis. Ohio State Med. Jour., v. 15, pp. 437-439.

Eye Diseases in the General Practice of Medicine. New York Med. Jour., v. 110, p. 71.

Eye Symptoms in Cinchonism. Edinburgh Med. Jour., v. 2, pp. 397-398.

Hendershott, H. Dentistry and Ophthalmology. Pacific Dent. Gaz., v. 27, pp. 426-431.

Karyophyllis, G. Lethargic Encephalitis. Greece Med., v. 21, p. 8. Abst., Jour. Amer. Med. Assn., v. 72, p. 1947.

Kraupa, E. Artificial Termination of Pregnancy (A Discussion of Adam's Reasons.) Woch. f. Therap. u. Hyg. des Auges, v. 20, p. 194.

Meissner. Grippe Complicated by Pain in the Eye and 5th Cranial Nerve. Centralbl. f. prakt. Augenh., March-Apr., 1919, p. 46.

Ohleman. Relation of General Diseases to Diseases of the Eye. Woch. f. Therap. u. Hyg. des Auges., v. 19, pp. 81-83.

Pagniez, P. Treatment of Migraine. Presse Med., Apr. 3, 1919. Abst., New York Med. Jour., v. 110, p. 34.

Sachs, E. More Intimate Cooperation between Specialists who See Neurosurgical Cases. (Dis.) Ann. of Otol., Rhinol., and Laryng., v. 28, pp. 76-85, and pp. 269-280.

Santos-Fernandez, J. Ocular Complications in Disease of the Liver. Rev. de Med. y Cirurg. de la Habana, v. 24, p. 59.

Wolffberg. Ocular Indications for the Artificial Termination of Pregnancy. Woch. f. Therap. u. Hyg. des Auges, v. 22, pp. 174-177.

Wood, D. Focal Infection in Relation to the Eye and Ear. Journal Lancet, v. 39, pp. 365-367.

Zade. Exophthalmos and Accessory Sinus Disease. Zeitschr. f. Augenh., v. 40, pp. 154-157.

Repeated Titles. **Lhermitte.** (v. 2, p. 80.) Amer. Jour. Ophth., v. 2, p. 453.

COMPARATIVE OPHTHALMOLOGY.

Macht, D. I., and Matsumoto, S. Action of Ovarian and Corpus Luteum Extracts on the Pupil of the Frog's Eye. Endocrinology, v. 3, pp. 154-155.

HYGIENE.

Halbertsma, I. N. A. Cooperation of Ophthalmologists and Light Technicians in Questions of Lighting. Woch. f. Therap. u. Hyg. des Auges., v. 20, pp. 137-139.

Heilborn, F. The Control of Myopia, A Means of Increasing Capacity for Work. Woch. f. Therap. u. Hyg. des Auges., v. 20, pp. 61-63.

Holth. Snow Glasses. Nord. med. Gesellchaft, 1915. Woch. f. Therap. u. Hyg. des Auges., v. 19, pp. 125-126.

Kerr, J. Eyesight and Education. (Dis.) Lancet, v. 21, p. 894, May 24, 1919. Amer. Jour. Ophth., v. 2, pp. 435-437.

Maryland Health Department Warning on Eye Strain. Jour. Amer. Med. Assn., v. 73, p. 117.

Monasch, I. B. Illumination. Woch. f. Therap. u. Hyg. des Auges., v. 20, p. 171-172.

Spalding, J. A. Conservation of Vision. Jour. of Maine Med. Assn., v. 9, pp. 301-311.

Thomson, E. Myopia in School Children. Brit. Jour. Ophth., v. 3, pp. 303-310.

Wolffberg. Protective Measures Against Ocular Suppuration and Resulting Infection in the New Born. Woch. f. Therap. u. Hyg. des Auges, v. 20, pp. 81-83.

Ziegler, K. v. School Hygiene in Rural Districts. Woch. f. Therap. u. Hyg. des Auges., v. 20, pp. 139-140.

OPHTHALMIC SOCIOLOGY.

Belfast Ophthalmic Hospital. Lancet, June 7, 1919, p. 997.

Better Eyesight: A Monthly Magazine. Vol. 1, July, 1919, No. 1.

Bondi, Max. War Report of the Hungarian Ophthalmological Society in Budapest. Woch. f. Therap. u. Hyg. des Auges, v. 19, pp. 197-198.

Bulletin of the Ophthalmological Society of Egypt, 1918. Brit. Med. Jour., June 21, 1919, p. 70.

Charles, J. W. Report of Committee on Blindness. Jour. Missouri State Med. Assn., v. 16, p. 240.

Crisp, W. H. The Blind. Colorado Med., v. 16, pp. 161-162.

Employment of Blinded Soldiers in Germany. Mod. Hosp., v. 12, pp. 466-467.

Failure to Notify Ophthalmia Neonatorum. (Medicolegal.) Brit. Jour. Ophth., v. 3, p. 336.

Fisher, L., and Lyman, H. W. Some Medical Problems of Aviation. (3 ill.) Amer. Med., v. 14, pp. 400-406.

Forster, v. Wartime Ophthalmology. Berlin klin. Woch., v. 53, pp. 380-381.

Greeff, R. Existing Magazines for Opticians and Spectacle Makers. Zeitschr. f. ophth., Optik., v. 2, pp. 157-160.

Heilborn, F., Rachfahl, H., and Röchling. Survey of Ophthalmology in the Four Quarters of the First Year of the War. Woch. f. Therap. u. Hyg. des Auges., v. 18, pp. 57-60, 137-140, 209-210, 213-214, 257-260.

Jackson, E. The Eyes of the Aviator. Amer. Jour. Ophth., v. 2, pp. 454-455.
Ophthalmology for Medical Students. Amer. Jour. Ophth., v. 2, p. 456.

Lewis, F. P. Group Study, a Necessity in Ophthalmic Research. (Dis.) Jour. Amer. Med. Assn., v. 72, pp. 1893-1897.

Loeb, C. What the Oculist Can Learn from Other Physicians. Illinois Med. Jour., v. 33, pp. 313-317.

Loss of Eye Greater Than Loss of Sight. (Medicolegal.) Jour. Amer. Med. Assn., v. 72, p. 1935.

McCallin, Mrs. S. Blind Civilians Receive Expert Training in Massage. (1 ill.) Mod. Hosp., v. 12, p. 466.

Massachusetts Commission for the Blind. Boston Med. and Surg. Jour., v. 181, pp. 13-14.

Merle and Schaidler. Rehabilitation of the War Blind. Deutsch. med. Woch., v. 42, p. 468.

The One-Eyed Man. (Social and Economic Efficiency.) Lancet, June 21, 1919, v. 196, p. 1085.

Ormond, W., and Roy, J. Statistical Report of the Ophthalmic Work Carried Out at the Second London General Hospital, St. Mark's College, Chelsea, S. W., 1914-1917. Army Med. Corps, London, v. 26, p. 57.

Panel Ophthalmic Practice. Brit. Jour. Ophth., v. 3, p. 327.

Purchaser of Good Will Injured as Oculist. (Medicolegal.) Jour. Amer. Med. Assn., v. 73, p. 137.

Quintana, A. Necessity for Regulating the Sale of Correcting Lenses. España. Oftal., v. 4, pp. 156-159.

The Rehabilitation of the Blind. Clin. Med., v. 26, pp. 467-468.

Snell, A. C. Method of Computation for Ocular Injuries Applicable to the New York State Workmen's Compensation Law. New York State Jour. of Med., v. 19, pp. 277-281.

Spearman. Visual Requirements for Aviators. Stereoscopic Vision. Lancet, v. 21, p. 894. Amer. Jour. Ophth., v. 21, p. 432.

Teaching and Examination of Medical Students in Ophthalmology. Brit. Jour. Ophth., v. 3, pp. 255-256, 327-328.

Van Cleve, E. M. Education of the Young Blind. (6 ill.) New York Med. Jour., v. 110, pp. 54-56.

Wile, I. S. Blindness. Amer. Jour. of Surg., v. 33, p. 174-175.

HISTORY AND BIOGRAPHY.

Buchanan, L. Thomas Reid. (1 ill.) Brit. Jour. Ophth., v. 3, pp. 289-292.

Greeff, R. Daza de Valdes' book "Uso de los Antojos." (3 ill.) Zeitschr. f. ophth. Optik., v. 6, pp. 97-104.
Nikolaus von Cusas' Book: "De Beryllo." Zeitschr. f. ophth. Optik., v. 5, pp. 42-44.
The Use of Spectacles and Magnifying Glasses in Early Ages. (Bibl.) Zeitschr. f. ophth. Optik., v. 4, pp. 142-146.

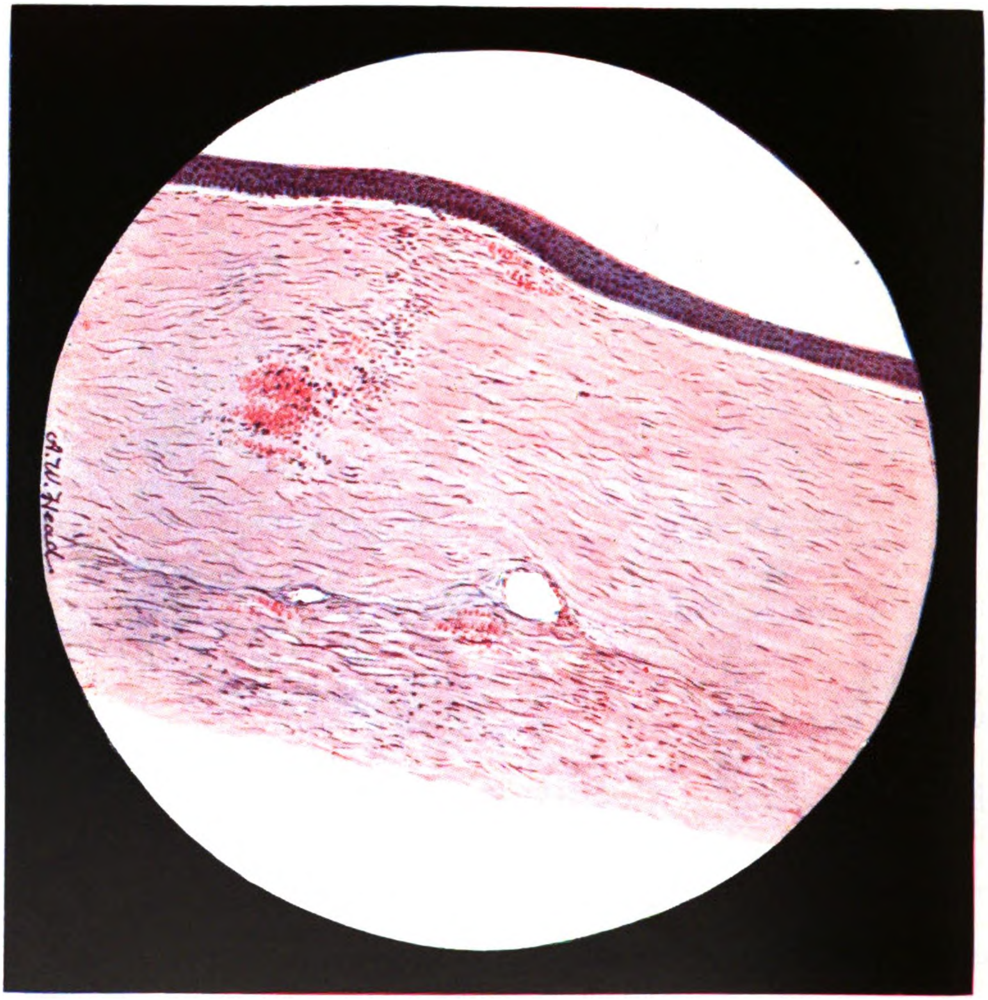
Hirschberg, J. Congenital Blindness among the Ancient Greeks. Centralbl. f. prakt. Augenh., Jan.-Feb., 1919, pp. 20-21.

The Poet Cowper and a Woman Oculist. Woman's Med. Jour., v. 29, p. 34.

Rohr, M. v. Early History of Glasses. (3 ill.) Zeitschr. f. ophth. Optik., v. 5, pp. 1-12, pp. 33-42.

Roman Oculist Seals. Lancet, June 7, 1919, p. 1012.

Shastid, T. H. Biographic Sketches. (1 ill.) Amer. Jour. Ophth., v. 2, pp. 458-463.



BLOOD STAINING OF THE CORNEA: X100
(MAGHY)

AMERICAN JOURNAL OF OPHTHALMOLOGY

Vol. 2 SEPTEMBER, 1919 No. 9

OBSERVATIONS OF BLOOD STAINING OF THE CORNEA.

CHARLES MAGHY, M. D.

LONDON, ENGLAND.

This report, from the Pathologist of the Royal London Ophthalmic Hospital, gives an account of four cases seen at that institution, and especially of the microscopic findings in three of the eyes, which required enucleation.

Blood-staining of the cornea was first described by Baumgarten[1] in 1883. It is a discoloration of the cornea resulting from the presence of blood cells in the anterior chamber, which in the majority of cases results from an injury, with or without penetration of the globe, altho it has been known to appear spontaneously after an intraocular hemorrhage in buphthalmos.

The time at which the phenomenon manifests itself clinically, varies from a few days to a few months—its duration may extend over months or even years.

It can be readily understood that it is a comparatively rare condition, when one considers the number of cases with eye injuries seen in ophthalmic practice. According to Römer[2] it occurred in one case out of 400 severe injuries at the Giessen Clinic. At the Moorfields' Clinic it has been observed in about the same proportion. Treacher Collins[3] saw 9 cases in 3 years.

There is some diversity of opinion as to what the coloring matter is and as to how it gains access to the cornea. Treacher Collins,[4] in his series of cases, considers the discoloration due to fluid passing thru Descemet's membrane by a process of diffusion and depositing hematoidin crystals in the corneal stroma, associated in some cases with hemosiderin. Weeks[5] is of the opinion that the pigment enters the cornea thru the spaces of Fontana in the soluble form of hemoglobin, and is there transformed into a salt insoluble in the fluids of the cornea. Vossius[6] thought there was direct hemorrhage into the corneal substance, the blood coming from the vessels at the limbus. Baumgarten regarded the refractile bodies, causing the discoloration, as microorganisms. Von Hippel[7] and Leber[8] as fibrin coagula. Römer as globulin masses—he at any rate, proved they were not fibrin by the use of Weigert's stain. Gutmann[9] showed they were not globulin by the fact that they were not acted upon by trypsin.

The refractile bodies are seen principally in the stroma. They vary in size and shape, but are usually rounded or oval. They average approximately 1.5 to 4 microns in diameter. They may be rod-shaped. With hematoxylin-eosin and Mallory's stain, they appear red. Van Gieson's stain gives them an orange color.

It has been demonstrated that hemoglobin is insoluble in water, alcohol, ether, xylol, chloroform, acetic acid, dilute mineral acids and weak alkalies.

Lyle,[10] Manual of Physiology, 1911, page 263, states, "Hematoidin forms flat lozenge-shaped crystals, and is found in the neighborhood of old blood clots, or hemorrhages which have occurred in the body, particularly in the brain or the lungs. It gives no absorption bands with the spectrum, and is iron free."

Case 1.—Morris D., aged 14 years. had the left eye needled four times at the London Hospital, the last being on May 12, 1908. In March, 1911, the eye became inflamed and painful, and on admission to Moorfields Hospital a month later, the cornea was found to be hazy, the ciliary vessels injected, and the anterior chamber full of blood. Vision equaled light perception with faulty projection. Tension = minus 1. The eye was enucleated and on pathologic examination, the haziness of the cornea was found to be due to blood staining of the corneal stroma.

Case 2.—William C., aged 43 years. was admitted September 12, 1913, under Mr. Hepburn, with a history of having been struck in the left eye by a piece of iron the day previous. The cornea showed a penetrating injury with iris prolapsed. The anterior chamber was full of blood. Vision equaled hand movements. Tension, minus. The Haab magnet proved negative. The patient was discharged in December and attended the outpatient clinic at regular intervals, vision now being 2/60. The hyphema had become absorbed and a small hypopyon occupied its place. On the 24th of December of the same year a fresh hyphema appeared and the tension became plus 1. January 23, 1914, the cornea showed extensive blood staining. The vision was reduced to fingers and the eye was very painful. The pain continued in spite of treatment and the eye was enucleated on February 7th, 1914. Right eye is normal. Vision equals 6/6.

Pathologic Report.—A healed scar is present in the center of the cornea. Bowman's membrane is intact and normal. The stroma shows dark, small, yellow granules, which are rounded and oval for the most part. These granules lie upon the fibers and between the corneal spaces. Descemet's membrane is not invaded. The anterior chamber contains laminated connective tissue, which is vascularized. Pigment cells are scattered about in this connective tissue. The iris shows atrophic changes and lies in contact with the cornea at places. The lens is forward. Choroid normal. The retina is not very atrophic. Optic nerve is cupped.

Case 3.—Emily H., aged 10 years, was admitted to Moorfields Hospital, January 2, 1915, under Mr. Hepburn, with a penetrating injury at the temporal side of the limbus of her right eye, the result of a blow with a stick. On admission vitreous was in the wound and the anterior chamber was full of blood. Tension, minus. Vision reduced to hand movements. A conjunctival flap was stitched over the wound and some vitreous escaped during the operation. On the 16th of January it was first noted that the cornea was blood stained. The hyphema was now disappearing, but no details were yet visible of the deeper structures. The eye became painful and was enucleated on February 2nd, 1915. L. eye normal. Vision equaled 6/6.

Pathologic Report.—Only the cornea was embedded. The epithelium is edematous. Bowman's membrane contains fine granules. These granules are coarse and predominate in the anterior part of the stroma. Some are rod-shaped but the majority are rounded and oval. Posteriorly, the granules are dustlike. The endothelial cells on the posterior surface show vacuolation opposite the area that is blood stained. The granules take the eosin stain.

Case 4.—Thomas D., aged 33 years, gunner, 65th R. G. A. Regiment, was in a gas attack for several hours on September 5th, 1918, from which time his eye trouble dates. He was treated at a base hospital in France after the attack with lotion and drops until October 8th, when he was sent to England. On October 10th he was admitted to Moorfields Hospital under Mr. Spicer. Examination at this time showed a burn of the conjunctiva below the cornea with marked conjunctival and ciliary injection. In the substance of the cornea was an area that was dark red in color, measuring about 6 mm. in diameter and occupying the lower and central part. Vision equaled light perception with faulty projection. Tension, minus. Not very painful. Right eye enucleated October 15th, 1918. Left normal, V. = 6/6.

Pathologic Report.—Macroscopic—The globe measures about 23.5 by 23 by 23 mm. The entire cornea is hazy and tends to bulge forward. A meridianal section shows the iris to be adherent to the posterior surface of the cornea. Blood clot in anterior chamber. Lens in situ. An exudate fills the vitreous. The retina is not detached. Optic nerve looks normal.

After staining the sections with hematoxylin-eosin and Mallory's stain, the cornea was reembedded and paraffin sections cut.

Microscopic—At the limbus corneae are seen many degenerated blood cells. The cornea is about normal in diameter. In contour it tends to form an anterior staphyloma. The epithelial layers are regular and enclose a mass of blood cells near the periphery. Thruout the stroma are seen areas of blood corpuscles. Small, dark colored, refractile bodies are also present, measuring about 2 microns in diameter on the average. These bodies are rounded and oval and take the eosin stain. Bowman's membrane and the rest of the cornea show nothing pathologic. The iris at the periphery is adherent to the posterior corneal surface. A few small hemorrhages are present in the iris stroma. The vessels are filled with blood. The pigment epithelium on the post-surface is uneven and in many places heaped into clumps. No atrophy or cell infiltration. The ciliary body shows the pigment epithelium covering the processes to be undergoing atrophic changes. The vitreous contains a mass of faintly staining cells and debris, the individual cells being difficult to describe on account of degenerative changes. The retina is not very atrophic and is not cystic anteriorly. The optic nerve is not cupped. Left eye normal. Vision 6/6.

In case 4, I dissolved the paraffin from the sections with xylol and placed them in the dark for ten days in undiluted peroxid without, however, affecting the refractile bodies.

CONCLUSIONS.

1. The highly refractile bodies seen in the corneal stroma in cases of blood-staining of the cornea are pigment granules transformed from hemoglobin.
2. Hemoglobin gains access to the cornea by diffusion thru Descemet's membrane.
3. The discoloration is due principally to the pigment granules altho blood corpuscles may be associated as shown by the plate. The degree of the discoloration varies according to whether hemosiderin or other hemoglobin derivatives are present.
4. The staining never affects the extreme periphery on account of the efficient lymph circulation at the limbus, nor do we find pigment granules in this area.
5. The presence of an iron reaction seems to depend on the vascularization of the tissue.

REFERENCES.

1. Baumgarten. Ueber eine eigenthümliche, auf Einlagerung pilzahlicher Gebilde beruhende Hornhautveränderung nebst experimentellen Untersuchungen zür Entstehungs und Mykosenlehre. Arch. f. Ophth., Bd XXIX. 3, p. 117. 1883.
2. Römer. Die Durchblutung der Hornhaut. Samml. zwanglos. Abhandl. aus. d. Gebiete d. Augenheilk. Bd. 11, p. 8.
3. Collins. Discoloration of the Cornea with Blood Pigment. Trans. of the Ophthal. Society of the United Kingdom. Vol. XV, p. 69.
4. Collins. Two cases of Staining of the Cornea by Blood Pigment. Trans. of the Ophthal. Society of the United Kingdom. Vol. XI, p. 43.
5. Weeks. Peculiar Pigmentation of the Cornea. New York Eye and Ear Infirmary Reports, p. 37.
6. Vossius. Ueber die eigentühmliche Grünliche Verfärbung der Cornea nach Traumen und ihre Beziehung zu Cornealblutung. Arch. f. Ophth. Bd. XXXV 2, p. 207.
7. Von Hippel. Ueber Hydropthalmus Congenitus nebst Bemerkungen ueber die Verfärbung der Cornea durch Blutfarbstoff. Archiv. f. Ophth. Bd. XLIV 3, p. 558.
8. Leber. Notiz über das Vorkommen von Fibringerinnunger in Gewebe der Hornhaut. Archiv. f. Ophth. Bd. XXXV 1, p. 271. Bd. XXXV 2, p. 250.
9. Gutmann. Ueber Durchblutung der Hornhaut. Centralbl. f. pract. Augenheilk. p. 43, 1909.

10. Lyle. Manual of Physiology. 1911, page 263.
11. Griffith. Blood-staining of the Cornea. Trans. of the Ophthal. Society of the United Kingdom. Vol. XIV. p. 74. Vol. XV, p. 86.
12. Halliburton. A Textbook of Chemical Physiology and Pathology, p. 293.
13. Hirschberg. Die Durchblutung der Hornhaut. Centralbl. f. prakt. Augenheilk, p. 177, 1896.
14. Lawford. Coloring Matter, Blood-pigment in Cornea. Trans. of the Ophth. Society of the United Kingdom. Vol. XIV, p. 74. Vol. VIII, p. 60.
15. Scheffels. Ein Fall von Durchblutung der Hornhaut. Zeitschr. f. Augenh. Ed. V., p. 277.
16. Schmidt. Ueber die Verwandschaft der hematogenen and autochtonen Pigmente und deren Stellung zum Hemasiderin. Archiv. f. path. Anat. u. Phys. u. f. klin. Medicin. Bd. 115. Heft 3, p. 397, '89.

THE X-RAY TREATMENT OF RETINAL GLIOMA.

Dr. Kaname Kusama, I. J. A. M. C.

TOKYO, JAPAN.

This paper reports three cases of glioma of the retina treated with X-rays and radium. In each case the ocular growth was checked, and the eyeball became shrunken; but metastases occurred causing death. The autopsy findings with microscopic examination in one case include a metastasis to the pancreas.

The fact that in a boy suffering from glioma of both eyes and subjected to X-ray treatment, the tumor-tissue had considerably shrunk after several exposures, was reported at length by Professor Komoto and myself at the General Congress of the Japanese Ophthalmological Society, in April, 1917. Since then, two other similar cases have been treated in the same way, but with radium radiations added to insure success. After one year, in all these three cases, a contraction of both eyeballs was witnessed, together with the shrinking of the gliomas.

Axenfeld has expressed himself on this point thus: "The action of radiotherapy is an elective one. It destroys the tumor but leaves the normal tissue undisturbed, as far as can be determined clinically." Altho our cases went on to phthisis bulbi, we were led to imagine at least that we could save the lives of the patients: and so we reported the cases, and continued the treatment.

But, during 1918, all three boy patients met with similar lamentable catastrophes. One began to suffer from meningitis, the second developed metastatic nodules thruout his body, and both these cases terminated in death. The third patient was attacked with metastatic tumors in the parietal region, and he too, died. Altho we were not wholly without fear of some such fatal result, our attention was focused upon the contraction of the eyeballs and involution of the primary tumors, so that, exulting in the local destructive power of the Roentgen rays and hoping to save lives of the patients we did not anticipate the eventful development of the metastatic tumors. The fact that phthisis bulbi may result from the use of X-rays has not yet been recorded by any authority.

This being the case, we hasten to report on the sad outcome as a corrective to our former too hopeful report. As a preliminary let us first of all sketch briefly the pathologic history of each case.

Case 1. A. H. aged one year and two months; both eyes suffering from retinal glioma in the second stage. Consulted us for the first time on September 12, 1916. Both eyes apparently sound externally, but on examination the pupils somewhat dilated; yellowish white tumor mass, on the surface of which retinal blood-vessels are visible; intraocular tension increased; altogether exhibiting the aspect of the amaurotic "cat's eye."

At first X-rays alone were applied, and shrinking of the tumors was observed; but exposure to the rays produced an erythema with edema at times. Therefore, after April, 1917, the frequency of the exposures to the X-rays was lessened and radium (0.99 gr.) was applied to each eye twice a week.

On the 8th of November, 1917, the eyelids were thickened, the eyelashes had all fallen out, and the conjunctiva was injected. The cornea was hazy, the aqueous humor had a reddish hemorrhagic appearance, the pupils and iris were obscure, the intraocular tension reduced. The eyeballs were contracted into the condition of phthisis bulbi, and sunk deep in the sockets. X-rays applied up to that date amounted to 486 H. (Holzknecht's units), while radium had been applied to each eye for one hour, in all 40 times.

This state of things continued to the end of January, 1918, when the patient was found sick, nauseated, and emaciated.

February 2, 1918. We took away a small quantity of clear spinal fluid by means of lumbar puncture.

February 7. Lumbar puncture again; but vomiting did not cease, and he died on February 18th.

The total duration of the treatment was one year and seven months. Exposures to X-rays, 93; quantity 645 .5 H; to right eye, 617 H., and to left eye, 584 .5 H.

The method of application of the X-rays was as follows: From the front on each eye 5-10 minutes every time, focus-skin distance 20 cm., hardness of tube 4-7 W., thickness of the aluminum filter 1.5-30 mm., thus total dose of X-rays 5-8 H. every time.

Summary:—In this case all the eyelids were inflamed from exposure to the X-rays, and the eyelashes fell out. The cornea became hazy, the anterior chamber hemorrhagic. Phthisis bulbi developed. Finally after eighteen months from the beginning of the treatment the patient died with symptoms of meningitis.

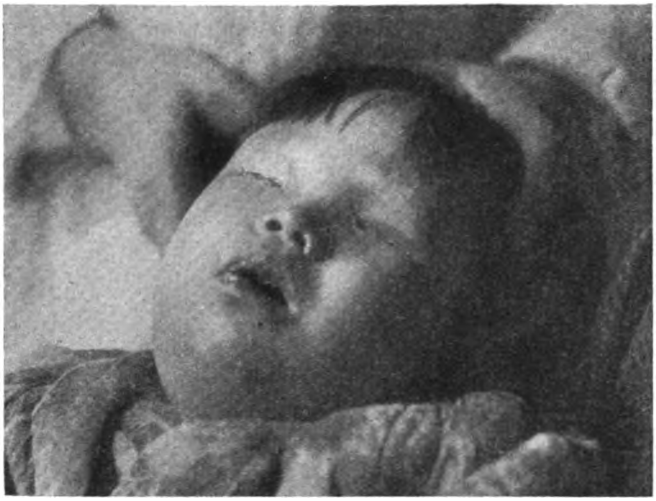


Fig. 1. Case 2, after ten months X-ray treatment, eyeballs contracted and sunken, lid margins macerated. Metastatic nodes in forehead. Right parotid region swollen.

Case 2. Y. K., a girl, 6 months old; retinal glioma of both eyes. First consulted us April 14, 1917. According to her mother, the child began to see with one eye only about September 1916. About January, 1917, she presented a "cat's eye" reflex from her right eye. From about February, 1917, her left eye showed a similar reflex. On examination both eyes exhibited the typical aspect of the amaurotic "cat's eye." Pupils somewhat dilated.

White uneven tumor-mass seen thru the pupil, bloodvessels running over the tumor mass; intraocular tension rather lowered.

X-rays and radium rays applied together.

June 15, eyelids became thickened; eyelashes fell out; conjunctiva injected. The tumor-tissue in the eye broken up, course of blood-vessels obscured.

July 14. External aspects the same, parenchyma of the cornea generally hazy. Both eyeballs somewhat phthisical.

August 29. Haziness of the right cornea increased; iris and pupil altogether obscured; the left eye appeared red, from bleeding in anterior chamber.

November 8. General aspects almost the same, the phthisis bulbi more marked.

X-rays applied to each eye, in all 30 times, to the total of 464 H.—Radium rays applied to each eye 30 times for one hour each time.

January 16, 1918. Right parotid region showed an elastic nodule about the size of a dove's egg, movable with the skin.

February 16. On the right forehead a chestnut-sized nodule was noticed, about the hardness of cartilage, movable with the skin. The nodule in the parotid region gradually enlarged covering the region of the cheek forward, extending over the cervical region backward, and stretching the skin.

February 18. A subcutaneous nodule was discovered in the right temporal region about the size of a dove's egg.

February 25. X-rays were applied to the above mentioned nodules. The tumors in the right parotid region shrank considerably, and nodules in the right temporal region disappeared; but the hard nodule on the right forehead grew larger and larger, reaching about the size of a bantam hen's egg. (Fig. 1.)

March 2. The application of X-rays to the nodules on the face was continued, and the hard one on the right frontal region almost disappeared, while the tumors in the right parotid region shrank to the size of a hen's egg. But two hard nodules were found in the inguinal region about the size of a finger tip and several hard nodules were felt under the abdominal wall from the size of an ordinary bean to that of a horse bean.

March 8. Both eyeballs greatly shrunken; eyelids inflamed from X-ray burns. Appetite lost, debility increasing. The patient died on the 12th of March after a night of delirium.

Her treatment continued for eleven months. X-rays were applied to each eye 46 times; for the right eye 296.5 H., and for the left eye 311.5 H. To the nodules in the right parotid region 10 times, 120 H., to those in the abdominal region, once, 8 H.

The method of application of X-rays to the eyeballs was the same as in the preceding case.

Summary:—In this case, the eyelids were inflamed from the use of the X-rays, and the eyelashes fell out. The cornea became hazy, the anterior chamber hemorrhage. Phthisis bulbi developed as in the preceding case. But in the present case, metastatic tumors broke out in the frontal right temporal and right parotid regions, under the abdominal wall, and in the inguinal region. The patient died debilitated.

Case 3. M. I., aged 5 months. Retinal glioma of both eyes in the second stage. January 28, 1916, consulted for the first time. Good physique and nutrition. But both eyes exhibited an appearance of "cat's eye." Pupils dilated. Intraocular pressure raised. In each eye, three large tumors are observed in contact with each other in the vitreous humor. In the right eye there were two large tumors, one above the other, and between them a nebulous tumor mass intervened. In the left eye, three similar tumors were in contact with one another by their margins, one being situated above the other with the third at their side. In both eyes, the blood vessels on the surface of these tumors ran as in healthy retinas.

February 23. Exposures to X-rays, three times, quantity 16 H. in all. Intraocular pressure somewhat lowered; retinal glioma considerably disintegrated, even to transparency, and nebulous tumor-mass greatly shrunken. Retinal glioma in left eye also somewhat shrunken.

May 23. Of the tumors in the right eye, the upper one and side one were all greatly shrunken and unless examined in the dark room, could not be made out; and only the lowest one remained. The big tumors one above another in the left eye, tended toward transparency, and their tumor-tissue appeared to be destroyed.

April 24, 1917. From this date radium (0.99 gr.) as well as the X-rays was applied once or twice a week for one hour.

November 8, 1917. The eyelids of both eyes thickened somewhat, eyelashes all fallen out. Eyelids, conjunctiva, and iris all congested. Around the pupil, on the iris margin, an irregular pigment ring had formed, presenting an ectropion of the pigment layer at the iris margin. Beyond the pupil, yellow tumor tissue was visible in the vitreous humor. The eyeball tended toward phthisical shrinking.

November 15, 1917. In the right eye, on the surface of the cornea, a blood vessel 1.5 mm. in diameter, is seen running up and in.

November 20. Around the blood vessels running obliquely on the surface of the right cornea, a parenchymatous haze was perceived.

December 8. The blood vessel running obliquely on the surface of the right cornea has already changed into a white line; and the infiltration round the blood vessel has become more extensive, causing parenchymatous haze, so that the anterior chamber and iris are completely obscured.

February 2, 1918. The middle of the right cornea gradually degenerated and shriveled, so that its tissue was broken, and perforated, to discharge a yellow mucoid matter. The left eye remained in the state of phthisis bulbi.

February 20. The perforation of the right cornea closed by the growth of surrounding tissue; but the cornea showed the signs of phthisis corneae.

February 25. The right eye gradually protruded, remaining in a shriveled condition. The eyelids and skin were tense and painful, and the debility being more and more marked, the right eyeball was enucleated.

March 9. In the right parietal region a hard nodule was felt about the size of a sparrow egg, and the debility increased. Both eyelids showed red spots from burning by X-rays, and the lid margins were greatly macerated.

March 30. The tumors in the parietal region had gradually enlarged to the size of a dove's egg.

April 14, 1918. The patient died.

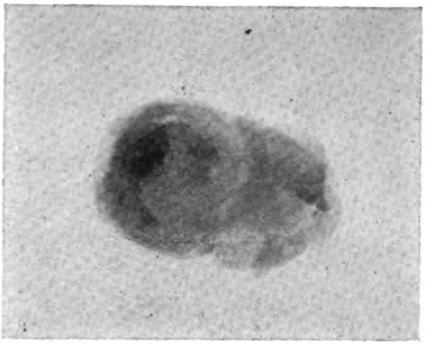


Fig. 2. Röntgenogram; enucleated eye from Case 3. Extension tumor continuous with globe has broken through the sclera posteriorly. Calcified lens and vitreous cause dark shadow.

The method of application of the Roentgen rays was the same as in the two preceding cases.

Inspection of Enucleated Eyeball:—The eyeball was in a shriveled condition, but had a white tumor mass of equal size attached to it, the whole measuring 30 mm. in length, and 20 mm. in breadth. The whole cornea was hazy, with a depression in the center, the edges of which were tinged with yellow.

Skiagraph of Enucleated Eyeball:—During section of the enucleated eyeball for pathologic study, the microtome knife grated on something. Suspecting a calcareous change we took a radiograph. In the region of the lens, a dense oval shadow is visible, while in the back part of the vitreous humor, one or two small dense shadows can be seen. (Fig. 2.)

Pathologic Study of Enucleated Eyeball:—The celloidin was dissolved away, the eyeball was thoroly decalcified by means of a 5 per cent solution of nitriacid, the eye again embedded in celloidin, and serial sections made.

The cornea is perforated in the middle, the edges of the perforation being considerably thickened, and is much infiltrated by round cells. The sclera is generally thickened, and at the horizontal plane in the middle of the eyeball, the thickest part reaches 2 mm.

The tissue of the eyeball is generally loose and rarified especially in the part in contact with the tumors that remain attached to the back part of the eyeball. Here, in two or three places, perforations exist; these being occupied by tumor tissue which connects the tumors within the eyeball with the tumor tissue behind the eyeball. That is, the tumors within the ball, perforating the sclera, have formed a large metastatic tumor mass beyond the ball.

The iris is thickened and infiltrated with round cells, and a part of it is in intimate relation with the perforated region above described. The ciliary body is generally loose and rarified, and is swollen. The choroid is detached from the sclera on the nasal side, and the space between them is filled up with a considerable amount of exudate staining red with eosin. Behind the equator of the eyeball the choroidal tissue is infiltrated thruout with loose tumor tissue, three times as thick as the sclera.

The retina is wholly replaced by the tumor tissue.

The calcified crystalline lens has lost its form in the process of calcification, while the vitreous humor is filled with tumor tissue, with the exception of empty spaces in the decalcified structure. The tumor tissue within the eyeball is loose, rich in blood vessels, hemorrhagic at the center and here and there degenerated.

The tumor tissue at the back of the eyeball is very compact, being formed of densely packed round cells with scarcely visible protoplasmic substance; almost no trace of the fibrous tissue is discernible there. Tho rich in blood vessels, and having degenerated spots, as in the tumor tissue within the eyeball, it shows no hemorrhagic center, thus resembling sarcoma.

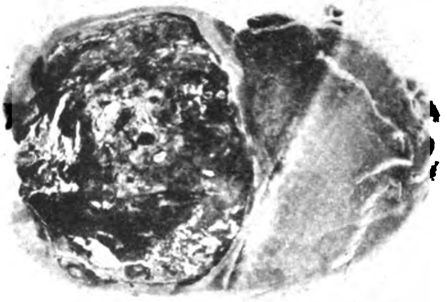


Fig. 3. Magnified photograph of enucleated eyeball, section.

This patient was, with the consent of his father, brought to autopsy, which revealed metastatic tumors in the bones of the cranium, the dura mater, the liver itself and the pancreas.

The report on the autopsy will be given later.

SUMMARY:—The retinal glioma in both eyes was greatly reduced in size by exposure to the X-rays; but this treatment produced such complications as the reddening and thickening of the eyelids, maceration of the margins of the eyelids, falling out of the eyelashes, perforation of the cornea, and shrinking of both of the eyeballs. Metastasis of the glioma to the cranium, dura mater, liver and pancreas led to the patient's death after treatment for two years and three months. The right eyeball proptosed by the metastatic tumors in the orbit, was enucleated and the crystalline lens was found to be undergoing calcification.

GENERAL CONSIDERATIONS.

The three cases treated with X-rays and radium, all were suffering from retinal glioma in its second stage.

In consequence of the application to them of X-rays and radium, the tumors themselves shrank, but at the same time the eyeballs underwent a similar change. One patient developed signs of meningitis, the second had metastatic tumors in the frontal and temporal regions, and the third (the autopsied one), had similar metastatic tumors in his cranium, as well as the internal organs, and all three cases terminated in death. The shrinking of the tumors in the eyes took place in a striking manner after a few exposures to the X-rays, but the phthisis bulbi took at the shortest 7 months, and at the longest two years. From the time in which the phthisis bulbi was first noticed until death occurred the course was rather rapid, from three to five months only. From the discovery of the metastatic tumors to the time of death the interval was very short; in the second case, 2 months, and in the third case only 1 month. The interval between the commencement of treatment and death was, the shortest 11 months, and the longest 2 years.

According to our experience, our mode of application of the X-rays could not prevent the growth of metastatic tumors. The X-rays, vigorously used, would destroy the tissue of all morbid tumors; but, if weak, might on the contrary stimulate the growth of such tumors.

If, with retinal glioma in both eyes, one eye only be thus vigorously treated, the other eye remaining untouched, may not the malignancy of the untreated tumor become enhanced by more rapid extension along the optic nerve, thru the sclera, or by general metastasis?

Axenfeld had a patient whose one eye had already been enucleated and to whose remaining eye, in which three small retinal gliomas were found, he applied the X-rays. On this patient Axenfeld reported three times. The first report[1] says: He began to treat the patient in 1914, and treatment continued for months; the quantity of X-rays applied being 3,385 Kienboeck units. The tumors shrank considerably and the sight was partially recovered. The second report[2] says: In January, 1915, 8 months after the first report, the smallest of the tumors was almost wholly absorbed, only leaving a grayish green spot on the retina. The middle-sized tumor below the macula lutea, also, was almost absorbed, while a white streak formerly present disappeared, leaving only a grayish white haze. The biggest of the tumors was not yet absorbed, tho considerably shrunken. Thruout the normal tissue, no disturbance was observed and the patient was mentally and physically sound. As to X-ray treatment, he goes a step further to say: "In all events, we wish to recommend that in future cases the amaurotic eye be not X-rayed, but enucleated, for the avoidance of diagnostic errors, in order to free the body of the prolific metastasis in the most logical manner. In beginning glioma to prevent a similar growth in the other eye, or to prevent later stages and recurrences in the event of improper use of the X-rays, the therapy may be used."

His third report was a paper delivered before the Ophthalmological Society in Heidelberg, which M. Patry has summarized in the Annales d'Oculistique[3] as follows: "The subsidence of the tumor, due to radiotherapy, continued. In the fall of 1915 a cataract developed. The patient, a child of 3 years, was operated upon in the spring of 1916; this was attended by a return of vision. For six months a state analogous to blindness by blepharospasm was produced, but the child actually saw. Will this improvement last? The child is normally developed both intellectually and physically. The still-growing lens had not been able to withstand the strong rays. But this is not a contraindication to the treatment. Radiotherapy is not preferable to enucleation, except in the second eye and when vision is not too greatly diminished."

In short, Axenfeld does not unconditionally approve the application of the X-rays to the treatment of retinal glioma. He says only: "When the visual power has not yet greatly diminished, or when the enucleation is refused; or in cases of later stages or relapse, its application is proper and justified.

But in his third report, Axenfeld, it seems, says nothing about the largest tumor, which had not been absorbed at the time of his second report. The great world war has prevented us from hearing from him for a long time. So the prognosis at least must be deemed still uncertain. In other words, his observation is not completed.

At any rate he asserted that two of his three tumors had been completely absorbed. Let us compare our cases with his. Was his success in the application of the X-rays due to the fact that his patient was in the first stage, and the tumor tissue very rudimentary? Or to the circumstance that his patient had had one eye already enucleated, and he had only to do with the remaining eye? Then let us consider that in our cases the patients were in the second stage, and the tumor tissue considerably developed, besides being dual; so that, tho on one side the rays acted destructively, on the other side they must have worked constructively, to help on the growth of metastatic tumor tissues. In our cases, might it not have been better and more effective if we had applied the rays simultaneously to both eyes, by means of a large, hard tube and a very thick filter; or to both eyes simultaneously but separately each from the temporal side, by means of two tubes?

Now I desire to state my conclusions with respect to the X-ray therapy based wholly on my personal experience.

CONCLUSIONS.

1. The X-rays should only be applied when retinal glioma is bilateral and the parents of the patient refuse to have one eye enucleated. In such cases the rays should be applied to both eyes jointly or severally by means of a big tube or two tubes both from the front as well as from the temporal regions.
2. After enucleation of the eyeball, when retinal glioma is unilateral, the X-rays may with great advantage be applied in order to prevent recurrence of the glioma.
3. Against retinal glioma in the last stage, or a relapse, the X-rays can prevent the local growth of the tumor; but it is impossible to save the patient's life by preventing the growth of metastatic tumors.
4. Axenfeld's statement, "After the enucleation of one eyeball, if a retinal glioma be found in the remaining eye, and that be in the first stage, and the visual power be perfect, exposure to X-rays may be tried with good results," cannot be accepted as established, until the final report is made on his patient's three tumors. For while one of them still remained unabsorbed, who can say that it would not undergo a metastasis in the future?
5. The tube employed in applying the X-rays should be very hard, and the filter must be very thick.

THE EFFECT OF ROENTGEN RAYS ON HUMAN EYES.

We employed a very thick aluminum filter (1.5 — 3. mm. thick), in applying the X-rays, but the frequency of application finally induced the thickening and reddening of the eyelids, maceration of the lid margins, falling out of the eyelashes, haziness and necrosis of the cornea, phthisis bulbi, and calcification of the crystalline lens.

Some of these have already been noticed by other observers before; thus Chalupecky[4] applied the rays to his patient for 24 hours (16 times in 27 days) and produced haziness of the cornea, and burning of his eyeballs. Birch-Hirschfeld[5] perceived, after 42 days, degeneration of the corneal surface and transformation of the cells of the optic nerves; and Triboudeau and Lafargue[6] observed inflammation and ulceration of the conjunctiva and cornea, and also the inflammation of the iris. But no one has yet recorded, as we now do, phthisis bulbi and calcification of the crystalline lens. This may be owing to the fact that their experiments did not continue so long as ours; the quantity of X-rays they used was much less than ours. Our prolonged treatments, and the great quantity of rays employed, no doubt afforded us this opportunity.

There remains one more interesting problem. That is the effect of X-rays upon the growing eye. Triboudeau and Belley[7] conducted a comparative experiment on a new-born rabbit and a mature rabbit, and found that in the former the X-rays interfered with the growth of the iris pigment, induced cataract formation, moreover the eyeballs became stunted, and the retina formed folds or wrinkles.

Von Hippel[8] applied X-rays to the abdomen of a pregnant rabbit, and the new-born offspring all suffered from congenital cataract. In Axenfeld's third report we see a similar effect on his child patient. It is plain that the X-rays exert a deleterious influence on the crystalline lens of the growing eye. Thus we are justified in inferring that the phthisis bulbi and calcification of the lens observed by us were chiefly due to the fact that our patients were very young and in the growing period, and further to the cumulative action of

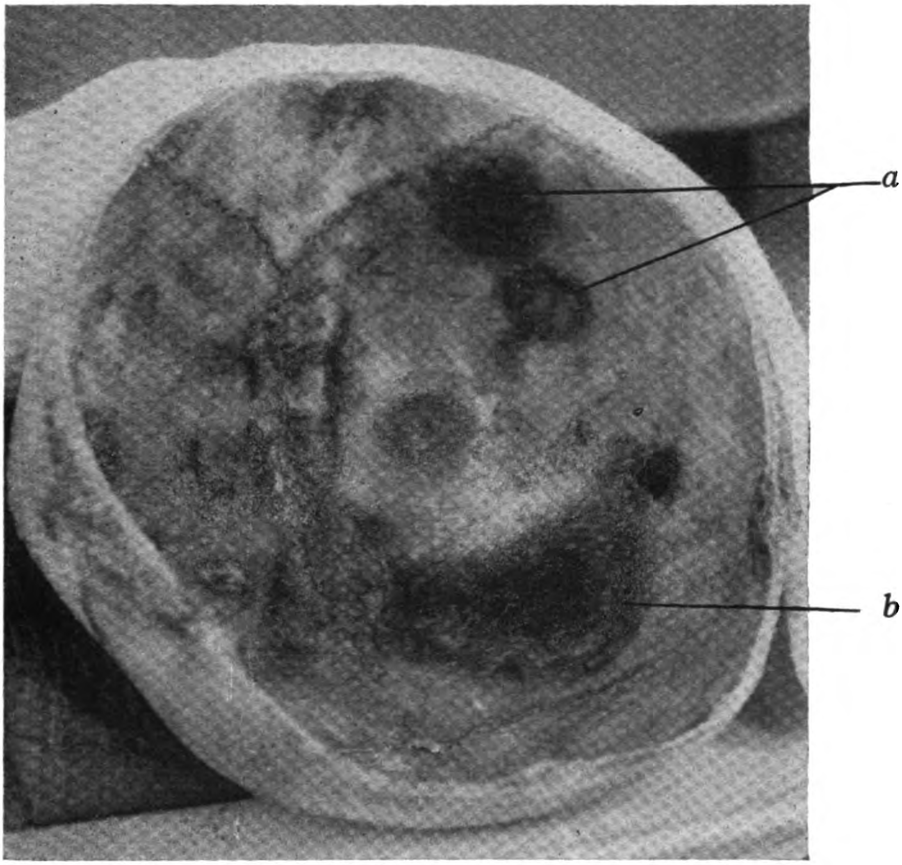


Fig. 4. Interior of cranium, Case 3. Small metastatic tumors, (a) the largest, (b) breaking thru the bony wall.

the rays. Axenfeld added this remark at the end of his paper: "We regard our observations as only a single foundation stone for the whole question." We are glad that we too are able to contribute two or three stones to the foundation of this important problem. Sincerest thanks are offered to Prof. Komoto, who kindly placed these important cases at my disposal. I offer also my warmest thanks to Dr. Iwazaki, the head of our X-ray department, who ably managed the application of the rays.

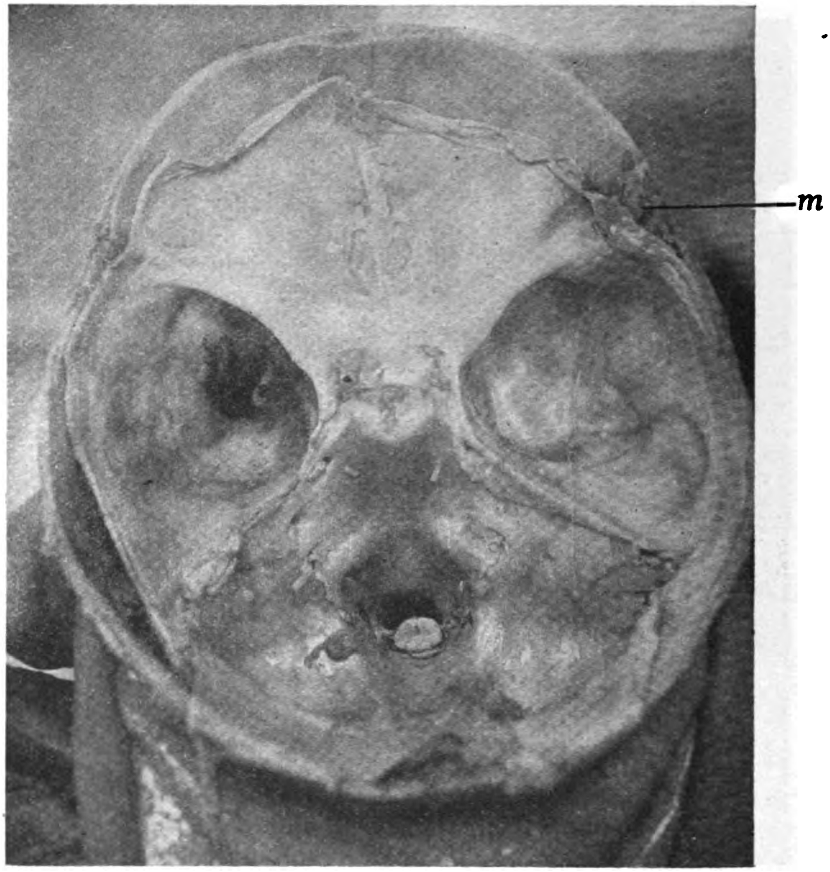


Fig. 5. Base of skull with dura mater; deep red metastatic tumors (m) between cranium and dura in temporal region.

[After I finished writing this article, I saw a report of three cases of retinal glioma to which radium was applied by Dr. Rex Duncan.[9]

The first case was one in which, after enucleation, a large quantity of radium (from 50 to 125 mgms.), was applied in order to prevent a recurrence of the tumor, no sign of which was observable after eighteen months.

The second case was one in which a recurrence was observed in the orbital cavity 5 months after enucleation; but the recurrent tumor shrunk considerably three weeks after the application of 110 mgms. of radium.

The third and last case was one in which, after enucleation, a small recurrent tumor was noticed in the central part of the orbit, a little to the nasal side; and after application of a tube containing 50 to 110 mgms. of radium, the tumor was speedily absorbed.

From this Dr. Duncan concludes that a retinal glioma may be cured without recurrence if enucleation is done early, and radium applied with a view to prevent its recurrence. Moreover, he has observed the efficacy of radium treatment even in cases where gliomatous tumors had recurred.

We are happy to state that this view, which recognizes the efficacy of radium application for preventing a recurrence, well accords with our views already expressed in the body of this essay.

But the "efficacy" of radium treatment refers apparently to the successful absorption of the recurrent tumors, altho not many months have yet elapsed since the absorptions referred to in Dr. Duncan's reports. The absorption or shrinking of the recurrent tumor in the second case only took place in November, 1917, and that in the third case occurred in June, 1917; so that he cannot yet positively deny metastatic transferences. Besides, we fear that the tumor cells in a recurrent case may not remain in the diseased spot alone.]

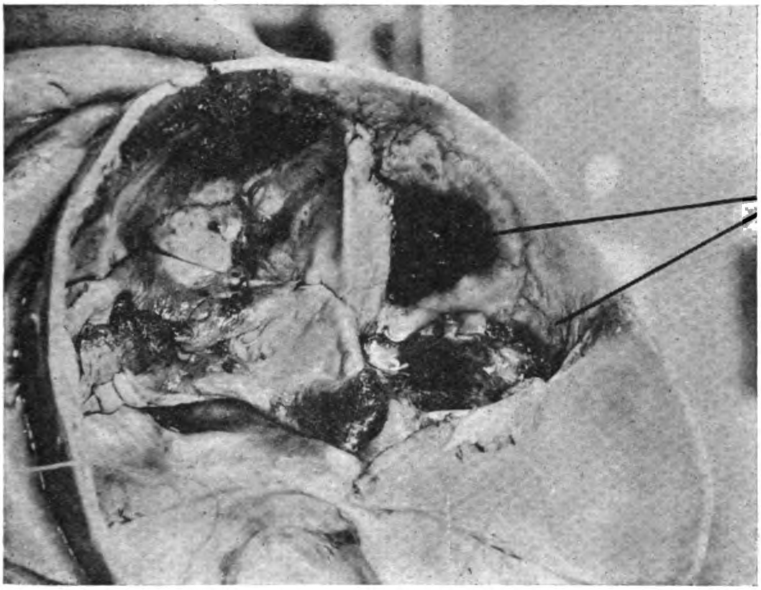


Fig. 6. Anterior cranial fossa with dura detached. Metastatic tumors (m) situated on surface of bone.

SUPPLEMENTARY OBSERVATIONS.

Report on Autopsy Findings: Third case, Makota Ishida. On the inside of the cranium are ten or more flat metastatic nodules, some large and some small, from the size of a pea to that of a hen's egg. These nodules are situated between the cranium and the dura mater, tho the inside of the dura mater is smooth, and there is no alteration in the tissues; only in the nodular portions, the tumor formations appear deep red. The dura mater is generally separable easily from the bone, but in the nodular parts, it adheres to the bone firmly, and when forcibly separated, a tearing sound is produced.

The smaller metastatic nodules are attached to the dura mater, and are easily torn away from the cranium, on the inner surface of which they leave mere depressions only (Fig 4, a). On the contrary, the large nodules break and leave tumor tissue attached to the cranium and dura mater. Of these nodules, the biggest one (Fig. 4, b), is situated in the right parietal region, and forms a longitudinally ovate sphere 9 by 5 mm. The tumors break thru the bony walls, and form dark-blue-reddish eminences on the outer surface.

At the base of the cranium are visible small nodular formations, presenting deep red tumors in the roof of each orbital cavity, and between the cranium and the dura mater; these tumors run along the right temporal region up toward the parietal region. (Fig. 6, m.) Further, when the dura mater of the base of the cranium is torn off, a number of deep red metastatic nodules running out from the orbit are observed. (Fig. 5, m.) The brain and the pia mater are normal and do not show any metastatic nodules.

As for the liver, a portal lymph gland of the liver was swelled to the size of a pea, while the surface of the section showed a deep red tinge. A deep red tumor as big as a hen's egg was prominently visible on the surface of the right lobe of the liver. The surface of the left lobe of the liver looked normal, but the cut surface showed a bisected deep red tumor about 5 mm. in diameter. The tumor, being soft, and a little swollen, was clearly distinguished from the liver tissue around it, which was deep red, sharply contrasted with the yellow section of the liver. Beside this several minor metastatic nodules were found. (Fig. 7, m.)

In the pancreas, too, a little nodule, about the size of a pea, was found at the head.

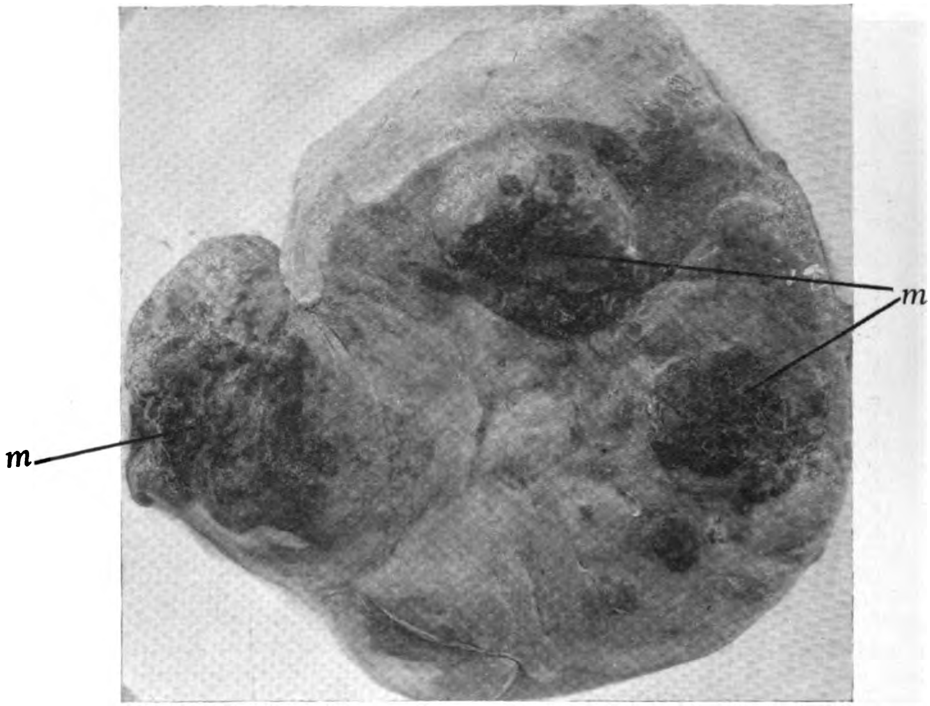


Fig. 7. Cut surface of liver, bisected deep red tumors (m) are prominent.

The lungs showed bronchitis, and the kidney parenchymatous cloudiness; but no metastatic nodules are found in either.

Microscopic Examination. The capsule of the portal gland of the liver (Figs. 8, t) is thickened, and in one part an infiltration of tumor cells is visible. As to the blood vessels of the capsule, some are filled with tumor tissue, and others with a few blood granules, while the parenchyma is mostly occupied by tumor cells, and severe hemorrhages.

With respect to the liver itself, in its normal portion (Figs. 8 and 9, l.), the coloring of cell nuclei is insufficient, and a considerable fatty degeneration is apparent; and tho there is no proliferation of the intermediate substance, hepatic lobules reveal a hemorrhagic infarct; and the liver cell trabecula shows an appearance of collapse, tho there is no infiltration of round cells, or new formation of capillary bile tubes.

The tumors in the liver (Fig. 8 and 9, t.), consist almost wholly of glioma cells, and contain little glia fibers, but no ganglionic cells. They are generally of a glandular composition, stained with hemorrhage in several places. In fine, these have the appearance of sarcoma.

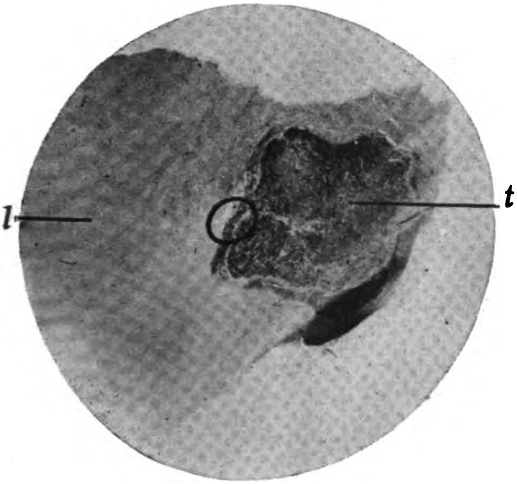


Fig. 8. Microscopic photograph of tumor tissue (t) with normal liver tissue (l). (Leitz oc. 1, obj. 3.)

In the normal portion of the pancreas (Fig. 10), the intermediate substance has proliferated, but no infiltration of cells is observed. The parenchyma, too, shows no infiltration, and the coloring of the cell-nuclei and the protoplasm is very good. The isles of Langerhans exhibit no special change. In the tumorous part (Fig. 10, t.), the intermediate substance is slight, while the tumors themselves present no glandular tissue, only tissue of a proliferating nature. In this metastatic transference there is severe hemorrhage.

In the liver, as well as the pancreas, the metastatic transferences show little or no infiltration of round cells, or degeneration thereof; on the contrary, they seem disunited.

PREVIOUS OBSERVATIONS.

In general, metastatic transferences of glioma in the head take place mostly in the brain and pia mater. Those that pass thru the bundle of optic nerves, settle in the substance of the brain; and those that go thru the optic disc, in the pia mater.

The former instances are far more numerous than the latter. They swell considerably about the chiasm and sella turcica, thereby overwhelming the adjacent tissues; or rise in the third ventricle, crushing the optic thalamus, or invade the temporal lobes, or the base of the brain, thus filling the greater part of the anterior and middle cranial fossae.

Instances of the latter are generally rare, as has been said above. Such metastatic transferences, when they reach the pia mater, infiltrate there, and usually form circumscribed metastatic seats, soft and flat.

In the present instance, the brain and pia mater were normal, without metastatic involvement.

Metastasis in the cranium is comparatively frequent, the tumors being flat and hemispheric, ranging from the size of cherries to that of the palm of the hand; and the path of transference is usually thru the diploe, some arising from the periosteum, and some from the dura mater. But in the last stage, all the tumors, regardless of their original connection, destroy the whole stratum of osseus formation, the dura mater also being broken thru. In the present case, the metastatic nodules are flat and hemispheric, ranging in size from a pea to a hen's egg. Smaller nodules have settled in the dura mater, medium sized nodules have depressed the inner surface of the skull bone, large nodules firmly attached themselves to the cranium while the biggest have infiltrated the whole osseus stratum, so that the condition is visible externally, showing that they have arisen from the dura mater.

2. *The metastasis in the liver.* Metastatic transferences of the glioma into

the liver are also very rare. The instances I have hitherto been able to study are only eight. All of them, however, are characteristic. Metastatic nodules are numerous, some small, and others large, ranging from the diameter of a pea to 5 or 8 mm. They are full of blood vessels, soft like marrow, mostly white, but in one or two instances, dark brownish red. In the present instance, many metastatic nodules are seen, both small and large, on the surface, and in sections, the largest measuring 5 mm.

According to Wintersteiner, the number of cases of metastatic transferences were: To the

Cranial and facial bones,	40 cases
Brain and pia mater,	43 cases
Lymphatic glands,	36 cases
Parotid glands,	9 cases
Bones of skeleton,	9 cases
The liver,	7 cases
Spinal cord and membrane,	5 cases
The kidney,	2 cases
The ovary,	2 cases
The lungs,	2 cases
The spleen,	1 case

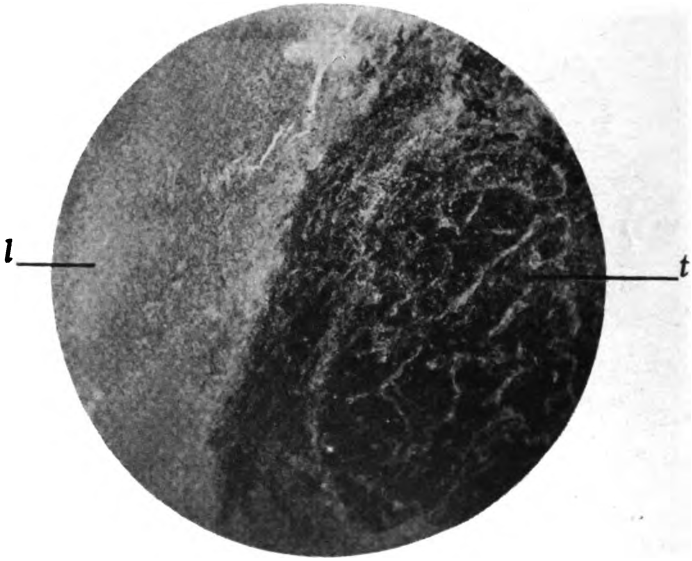


Fig. 9. Enlargement of Fig. 8. (Leitz oc. 1, obj. 7.)

The most extraordinary characteristic of this case, is the deep red color of the tumors, contrasted with the bright yellow tinge of the liver tissues around, enhanced by the fatty degeneration.

3. Finally as to the metastasis in the pancreas, this kind of metastatic transference is quite unprecedented, at least in the available literature. In the present instance, metastatic nodules are found on the upper surface, and microscopic inspection shows the same condition as in the liver.

Metastasis of glioma, in general, is rare, even in its best known form, namely: metastatic transferences into the brain, pia mater, cranium and facial bones.

I find also these further reports of such metastases: Lauber,[12] of the cranium, cervical lymphatic glands, and the lungs; Neese,[13] of the skull bones; Radoliffe[14] and Siegrist,[15] of the liver; Gardiner,[16] of the liver, cranial and facial bones, vertebral column, sternum, or pubis, ischium, cervical lymphatic glands, and testicles; Siegrist,[15] of the brain and pia mater; Kashiwabara,[17], under Prof. Dr. M. Inouye, of the skull bones, spinal cord, and lacrimal gland.

Of the three cases I have investigated, 2 were not dissected; but they showed clinically that one had metastatic nodules in the cranium, parotid glands, glands of the axilla, abdominal glands, the inguinal lymphatic glands.

The other no less clearly indicated transferrence in the pia mater.

Of these, Gardiner's observation on the testicles and Kashiwabara's on the lacrimal glands are new; to which may be added the present investigation on the pancreas.

CAUSE OF METASTATIC TRANSFERENCE.

Finally we must consider the cause of such metastasis. In the three cases we have investigated, all had these fatal transferences; but their cause is doubtful. We may surmise: As our case of retinal glioma was bilateral in its nature, its capability of growth was doubled. The cause might be inherent individuality, but the exposure to X-rays must, we fear, have contributed to the metastatic transference. The X-rays have, no doubt, destroyed the gliomatous tissue on the exterior part of the tumors, but at the same time the rays may have given greater stimulation to their basal portion, so as to quicken their growth. This undesirable stimulation had the effect, it is presumed, of spreading the germ of the tumor thruout the tissues of the body.

According to the statistics of Wintersteiner,[11] double glioma of the retina composes 5 per cent of all such cases, and so it cannot be called very rare. But, as shown above, the occurrence of such metastatic transference is rare, tho it cannot be limited to bilateral cases. If the metastasis of our cases is to be attributed to the bilateral character, it would be contrary to the statistics.

Now, in our cases, if no X-rays had been applied to them, and the retinal glioma had advanced in the debilitated patients to death, such metastatic transference might not have occurred. Therefore, the application of X-rays must be thought to have at least contributed to the fatal consequences.

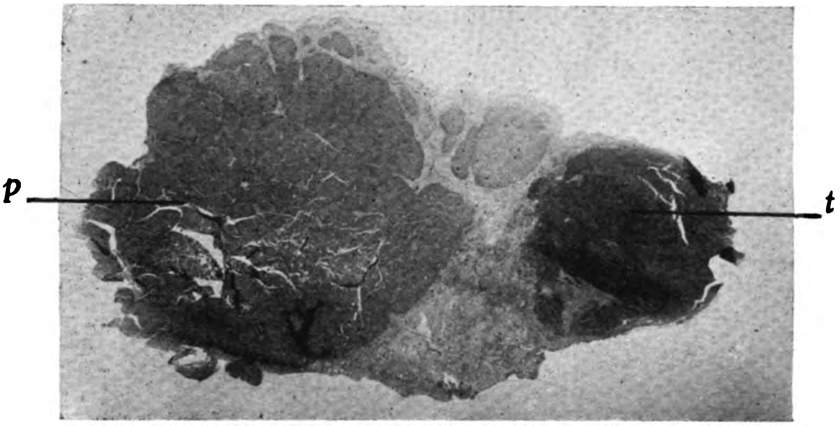


Fig. 10. The pancreas. Tumor tissue (t). Pancreas tissue (p). (Leitz oc. 1, obj. 3.)

REFERENCES

1. Axenfeld, T. Doppelseitiges Glioma Retinae und intraokulare Strahlentherapie. Klin. Monatsbl. f. Augenh., v. 52, p. 426.
2. Axenfeld, T., Kupferle, L. and Weidersheim, O. Glioma Retinae und intraokulare Strahlentherapie. Klin. Monatsbl. f. Augenh., v 54, p. 61.
3. Kusama, K. X-ray Treatment of Retinal Glioma, Nippon Gank. Zasshi, Dec., 1918.
4. Axenfeld, T. Radiotherapie Intraocular. Reun. de la Soc. d'Ophtal., á Heidelberg, 1916. Ann. d'Ocul., March, 1917.
5. Chalupecky. Ueber die Wirkung der Röntgenstrahlen auf die Auge und die Haut. Centralbl. f. Prakt. Augenh., v. 21, 1897.
6. Birch-Hirschfeld. Die Wirkung der Radium und Röntgenstrahlen auf die Auge. Graef. Arch. f. Ophthal., v. 59.
7. Triboudeau and Lafargue. Die Anwendung der Röntgenstrahlen in der Regio Ocularis Arch. d'Electricite Medicale, No. 252. Fortschritte auf dem Gebiete der Röntgenstrahlen, v. 13.

8. Triboudeau and Belley. Arch. d'Electricite Medicale, No. 207. Fortschritte auf dem Gebeite der Röntgenstrahlen, v. 12.
9. von Hippel. Ueber angeborene Schichtstar. Sitzungsbericht 32. Versamml. d. Opht. Gesellsch. in Heidelberg, 1905.
10. Duncan, R. Glioma of Retina with Report of Three Cases Treated with Radium. Amer. Jour. Ophth., v. 1, p. 715.
11. Wintersteiner. Das Neuroepithelioma Retinae, 1897.
12. Lauber, H. Eine Moulage, photographien und anatomischen Präparate eines Gliomas der Retina mit Metastasen. Wiener Ophthal. Gesellsch., 17 April, 1907. Centralbl. f. prakt. Augenh., v. 31, p. 239.
13. Neese. Zwei Fälle von intraokularem Tumore in atrophischen Auge. Westnik Ophthal Nagel's Jahresbericht, 1907.
14. Radoliffe and Goldberg. Ein externer Fall von Glioma Retinae. Arch. f. Augenh., v. 59, p. 55.
15. Gardiner. Bilaterales Glioma der Retina mit zahlreichen entfernt liegenden Metastasen. Arch. f. Augenh., v. 64, p. 93.
16. Siegrist. Setlene Art der Ausbreitung von Gliomen der Retina auf zwei Sehapparat. Bericht über 39ten Vers. d. Ophthal, Gesellsch. p. 390. Nagel's Jahresbericht, 1913.
17. Kashiwabara, K. Retinal Glioma Metastatically Transferred into the Skull-bone, Spinal Column, Ribs and Lacrimal Glands. Ganka Rinsho Iho, v. 10, p. 231.

THE OCULAR COMPLICATIONS OF DENGUE FEVER.

HANS BARKAN, M. D.

SAN FRANCISCO.

This paper calls attention to dengue as probably a cause of such paralyses as are known to be associated with diphtheria, and gives reasons for the belief in such association, and the fact that it has been hitherto overlooked.

A case of abducens paralysis following dengue, and a case of paralysis of accommodation following dengue, seen in my office last August, caused me to investigate the literature. I was under the impression that I had never noted any eye lesions in conjunction with or following dengue reported in medical literature, except the severe pain in and about the eyeball during the height of the fever; my search of the literature found it barren of any mention of dengue and ocular complications. The publication of two cases seems to me, therefore, to be justified.

CASE 1. Mr. A. B., a resident of Honolulu, consulted me August 16, complaining of double vision. This he had first noted on the 9th day after the onset of the acute febrile paroxysm, severe headache, and intense muscular and joint pains with which his attack of dengue had started. The diplopia, while at first very annoying, had become less noticeable, but still embarrassed him, and prevented him from engaging in out-of-door sports, such as golf. He still felt very weak, perspired freely on slight effort, and had lost 15 pounds in weight.

Examination: External inspection negative. Test for ocular movements, balance and range showed slight abducens paralysis, right eye. Fundus negative. Vision 10/10, no glasses worn. Hypermetropia of 0.5 D. Urine negative. Blood Wassermann the same. No history of infection. Transillumination of sinuses, nose, throat and examination of teeth negative. Seen two weeks later, in better general health, had no complaints to make; diplopia could be elicited with difficulty. Discharged.

CASE 2. The day following the examination of the above case, Mr. B. H., also a resident of Honolulu, a friend of my first patient, consulted me. He had had dengue fever at practically the same time. Two weeks after the initial paroxysm on attempting to read, he found it impossible. He now complains of slightly blurred distant vision and inability to read anything but the headlines of a newspaper. His general condition is good.

Examination showed pupils round,

dilated almost maximal, very faint response to light, none to accomodation. Fundus negative. All else negative. Vision was 8/10, brought to 10/10 by +0.5 sph. Reads Snellen 0.5 with +3.5 sph. at 33 cm. In view of the first case, I made the diagnosis of paralysis of accommodation following dengue fever, with a certainly favorable prognosis. Blood examination for Wassermann, and urine examination were both negative. No source of focal infection could be found.

Temporary reading glasses were prescribed. I saw the patient a few times during the next month, during which time the accommodative power gradually returned. When he left for home, 6 weeks after his visit, accommodation was restored completely, altho fatigue in reading would set in rapidly, and the near point recede. Five to ten minutes' rest, however, would enable him to again read Snellen 0.5 at 20 cm. Age 37.

That in both these cases the ocular condition was subsequent and due to dengue fever will not, I think, be questioned. The negative results of all tests and examinations made for the usual and frequent causes of ocular paralysis; the coincidence of both patients having had dengue at the same time and in the same locality; the appearance of the ocular lesion in the first case 9 days after the initial acute febrile paroxysm, in the second case 14 days afterward; and finally, the fact that in both cases the ocular complication involved the neuromuscular apparatus, and was self-limited, with complete recovery, establishes with as much certainty as is possible, the connection between the attack of dengue fever and the subsequent ocular complications.

It might be asked whether or not they had dengue fever in the first place. The description of the disease as given by both cases presented the typical symptomatology,—they were suddenly seized with an acute febrile paroxysm, chills, accompanied by very severe pains in all muscles and joints, intense headache and complete prostration. On the first day both had extreme anorexia and vomiting. The maximum temperature was said to have been between 104° and 105° on the 4th day. While no rash was noted at first, it appeared on the 5th or 6th day, being most prominent on the face, tho there was some also on the arms, trunk, thigh and legs. A bran-like desquamation lasting a week, occurred on the 13th or 14th day. On the 9th and 14th days respectively, the patients noted the ocular symptoms. A note written to their medical attendant in Honolulu has met with no response; but from the above, there is no other disease that can have afflicted them, especially in a locality where dengue is endemic.

Considering the connection between the ocular lesions and dengue as being established, it may not be out of place to review in brief the established facts regarding dengue fever, sometimes known as dandy fever (because of the stiff and mincing walk), break-bone fever, stiff-necked fever, giraffe fever, polka fever, bouquet fever, (corrupted into bucket fever), knockel-koorts fever, and by other descriptive popular names. The description of the disease as given above is the typical form.

It may occur so suddenly and with such complete prostration as to strike down the sufferer at his business, pleasure or devotions. The intense and excruciating myalgia and joint pains are the most typical symptoms. Here may be mentioned the only ocular complaints occurring as a rule, namely the intense retroorbital and supraorbital pain, and often great pain on attemped ocular movement. The disease lasts from 10 to 14 days, during which time the temperature is usually highest on the 4th or 5th day, varying between 103-106° F. There is then often a remission in symptoms followed by return of symptoms and by a rash, described previously. Death following dengue is practically unknown. The complications and sequelae are few, occasionally hemorrhage from mucous surfaces, inflammation of serous membranes, and rarely pleurisy, orchitis, pericarditis and endocarditis.

The disease is one usual in tropical and subtropical countries, although it has occurred in outside zones, as, for instance, in Philadelphia, New York and Boston, appearing in the summer and disappearing in winter. In tropical countries it stays fairly well confined to the coast and adjacent country, especially along the routes of travel. It occurs in both dry and moist atmospheres, altitude, however, acting as an inhibiting force.

The cause is still uncertain; from analogy some insect as a carrier would seem most probable. While some investigators have found a hematozoön in the red blood corpuscles, leucocytes and occurring free in the blood plasma, and have found this same organism in the stomach of Culex fatigans up to the 5th day after being fed upon blood of patients ill of dengue fever, other competent investigators deny its existence. The main points of agreement are that the pathology consists of a well-marked leukopenia, the polymorphonuclear leucocytes being decreased, with a marked increase in small lymphocytes; that it can be transmitted through Culex fatigans, and that is probably the common method; and that the organism is probably ultramicroscopic.

Returning for a moment to the two cases cited,—in countries where dengue is endemic, ocular muscle paralysis from other causes certainly exists, and when large numbers of the population are afflicted with dengue, certain ones might very well develop an abducens paralysis or accommodative paralysis during the fever, not in relation to it, but rather as the result of some of the common causes. This is not likely in the two cases cited, as both proved absolutely negative in the search for an inciting cause other than dengue.

It is also conceivable that due to the prostration occurring with dengue, an ocular paralysis from another cause might be favored and accelerated in its appearance, just as, for instance, in a heavy smoker and alcoholic, a tabetic nerve atrophy is apt to take a rapid course. Again, in view of the negative examination, this is not likely to have been the case in these two instances. It might be said that because 75 per cent of the population in some influenza epidemics is infected, therefore ocular lesions occurring in these are not related to the influenza, but would have occurred in the same number and time if free of influenza. But we know, for instance, that certain ocular diseases, such as herpes corneae, are much more frequent during an epidemic of influenza, and much rarer before and after an epidemic.

In dengue we are acquainted with one constant ocular symptom, the intense aching of the eyes, whether a true myalgia or a slight degree of serous tenonitis, or periostitis, is uncertain. It is rather surprising that ocular complications, such as the two cases of muscular paralysis I report, are not more common; there are many similar points in dengue and influenza. With the existing similarities it is curious that dengue has not been known to be complicated by ocular diseases common in association with influenza, —one need think only of acute hordeolum, keratitis neuroparalytica, herpes corneae, keratitis punctata superficialis, neuritis optica, muscular paralysis, iritis, etc.

As dengue occurs so largely among the ignorant tropical population, and as ocular sequelae may be late effects, it is quite conceivable that they may occur frequently, but be overlooked, especially if they be ocular paralyses causing no pain or inflammatory signs and recovering spontaneously.

AN OPERATION RELEGATING ENUCLEATION OF THE EYE TO ITS PROPER POSITION.

T. J. Dimitry, M. D.

NEW ORLEANS.

This paper presents an argument for a better operation to replace the enucleation of the eye in most cases. It describes such an operation, which the author has performed in twenty cases, and discusses its technic and results.

The reason for this contribution is to again insist that my confréres take cognizance of a superior surgical technic which should, in the majority of instances, replace enucleation, a quite unsatisfactory operation when considered as to its cosmetic, and, hence, as to its economic, results.

The enucleation of the eye is a rapidly and rudely performed procedure, and generally gives the impression that the sole aim of the operator is to get the offending member out. The muscles attached to the eye are cut, the optic nerve is severed, the eye delivered and hemorrhage controlled by pressure—this nonesthetic and purely mechanical procedure is the accepted performance, and it constitutes the operation of enucleation. Any nicety of technic aimed at obviating disfigurement is very generally ignored.

When the prothesis is inserted, following this crude surgical procedure, three highly unsatisfactory conditions, to say the very least, are almost surely present. We have an artificial eye sunken deeply in the socket, with a consequent lack of symmetry with the natural eye; we have sagging lids, and we have an eye staring rigidly and vacantly into space. Injury to the sympathetic incident to the operation of enucleation has been considered in a previous paper[2] as a probable factor to account for these unsatisfactory conditions; but, in addition, there are primarily some purely mechanical factors worthy of note: (a) the deeply sunken artificial eye can be attributed to the practically empty socket resulting from enucleation; (b) the sagging lids to the disturbance in relation between tension of, and pressure against. the palpebral muscles caused by the sunken prothesis, and (c) the rigidly staring eye results from the severed recti muscle.

These deformities are inexcusable, and can be avoided. Hence it is that I have been insistent that we improve upon what is undoubtedly a faulty surgical procedure, however skilfully it is performed.

I grant that enucleation may be compulsory in malignant conditions of the eye, or justifiable, as in advanced age, where appearances count for little as against the necessity for a rapidly performed operation; but it is not even justifiable in any one other single condition.

The laudable efforts of our government to rehabilitate the injured and disfigured soldier, and to restore him to a condition where he can most readily earn his own livelihood, should teach the lesson that the removal of the eye in civil practice should not be considered on a parallel with the emergency operation of the battle field that so often makes necessary later plastic treatment.

The civilian surgeon also is today removing postoperative disfigurements solely with the view of a cosmetic improvement; and much of this plastic surgery would be unnecessary had the patient been rationally handled in the first place. Yet, with respect to eye surgery, or to that part of it under consideration, very little is being done to preserve a normal appearance; and we must admit that a good appearance has no inconsiderable economic value.

Postoperative appearances are to be shown every consideration, and we must use the utmost care in preventing any avoidable disfigurement consistent with the welfare of the patient. That the observance of this surgical principle has been, and still is, so flagrantly ignored by the ophthalmologist, above all others, seems to me inconceivable.

I am familiar with the fact that some few surgeons are using tardy methods to correct, or to a lesser degree, seeking to prevent, these unsatisfactory results of an imperfect technic. But they are very few, and it is exceedingly difficult to gain serious attention to anything having a semblance of contrariness to text book teachings. Under the circumstances we would be justified in demanding that our teachers and authors more insistently impress upon the tyro the exact limitations of the operation of enucleation; for this operation is so easily performed, and so comparatively free from danger, that this inexperienced man is enucleating the eye at the slightest pretext. Some even have the conceit, once they have performed this operation, to regard themselves as finished surgeons.

The authentic case of the man who attempted to qualify as a brain surgeon in the Medical Reserve Corps for the sole reason that he had successfully treated scalp wounds during a considerable industrial practice, has its analogies in the records of the office of the Surgeon General in some instances where men wished to qualify as finished ophthalmologists for the reason that they had successfully enucleated the eye.

If we consider the muscles of the eye, situated in pairs each conveniently opposite its mate; and when we consider that so few make any serious attempt to utilize this great opportunity to conserve a practically normal muscular action, even by end to end suturing, and, further, that this undoubted neglect of opportunity acts to the detriment of the patient, both cosmetically and economically, I am impelled to ask if the operation of enucleation, as commonly performed, can be considered as a rational surgical procedure in the great majority of cases. My answer is that it cannot be so considered.

My operation is advocated for the reason that it practically obviates injury to the sympathetic nerve, conserves the normal movements of the eye, provides a foundation for the prothesis, and hence, a filled in socket, all tending to prevent disfigurement, and in that it exposes the patient to no greater risk from sympathetic ophthalmia than does enucleation.

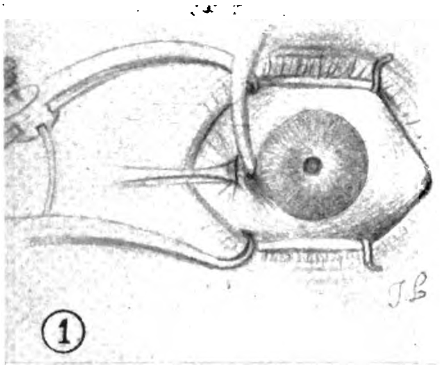
Any consideration of other substitute operations must take into account especially the important question of sympathetic iridocyclitis; and the writer, before first advocating his operation, had given serious thought to the other substitute operations for enucleation. His early opinion that the advocated operation provides for all eventualities to a greater extent than do other substitutes is now more firmly fixed than ever.

The advocated operation is an *evisceration of the sclera, with the removal of a section of it* POSTERIORLY *including a severance of the optic nerve.* A gold ball is inserted within the sclera, and the anterior opening is closed. The posterior opening is not closed. This latter feature is very essential, and a little thought should convince one of its merits.

The procedure begins as in an evisceration; that is, the conjunctiva is first undermined, and the anterior aspect of the globe is resected. The point of resection is about 2 mm. posterior to the corneoscleral junction. The contents of the globe are removed, and any possible slight hemorrhage is easily controlled. A section is made in the posterior aspect of the sclera from within, and, at the same time, the optic nerve is severed.

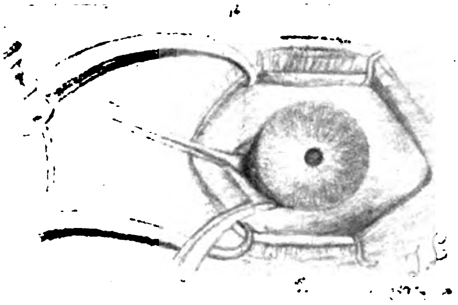
This latter procedure is quite readily carried out by puncturing the sclera with a Graefe knife, and with a pair of curved scissors cutting in a circle around the insertion of the optic nerve, thus severing it from the sclera. The detached portion of the sclera with its attached portion of nerve are then removed after section of the latter. The long ciliary nerves may also be cut, if desired; but it is not the custom of the writer to do so.

The sclera is now turned from within outward, evaginated, and every vestige of choroidal tissue is removed. It is then returned to its normal position, invaginated, and two small triangular sections of it removed at both sides of



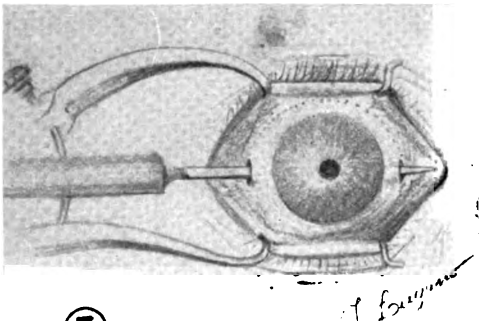
①

TO OPEN CONJUNCTIVA



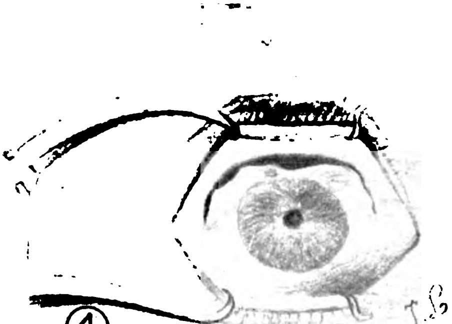
②

TO FREE CONJUNCTIVA



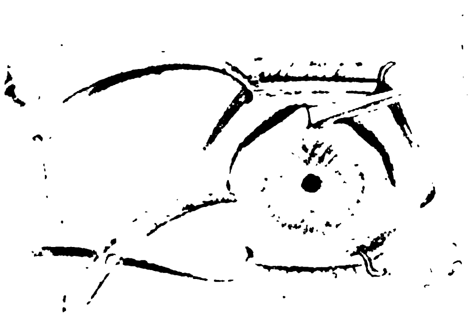
③

TRANSFIXED WITH GRAEFE KNIFE



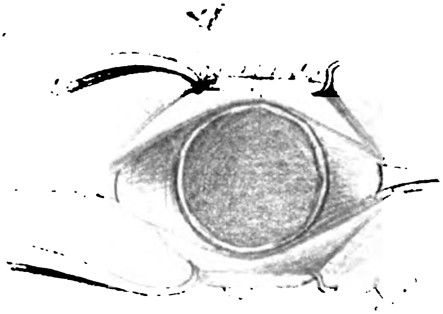
④

UPPER FLAP CUT WITH GRAEFE KNIFE



⑤

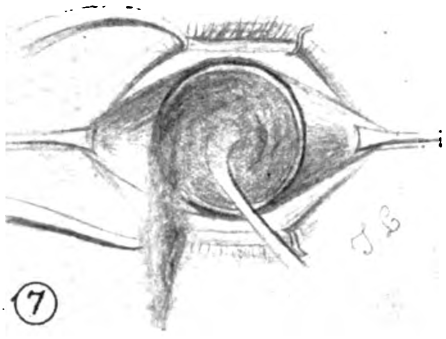
READY TO EXCISE ANTERIOR SEGMENT



⑥

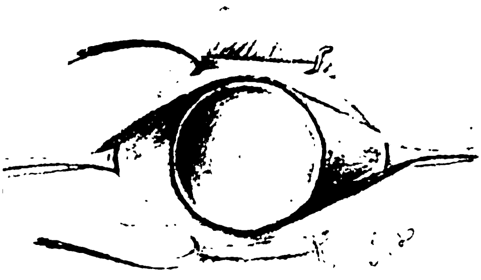
ANTERIOR SEGMENT EXCISED

DIMITRY'S SUBSTITUTE FOR ENUCLEATION



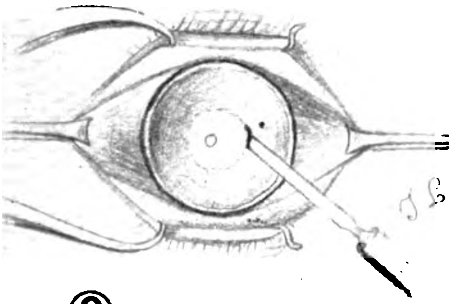
⑦

REMOVING CONTENTS OF SCLERA



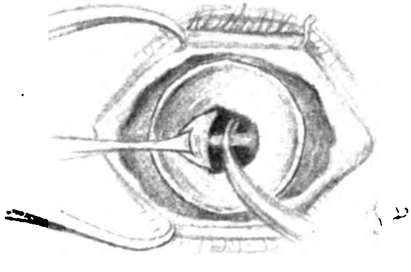
⑧

SCLERAL CAVITY EMPTIED



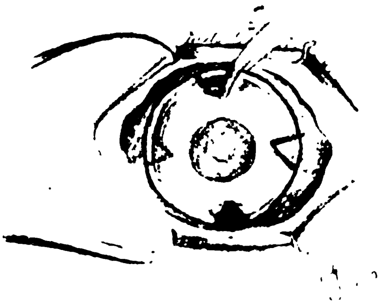
⑨

CUTTING WINDOW IN BACK OF SCLERA



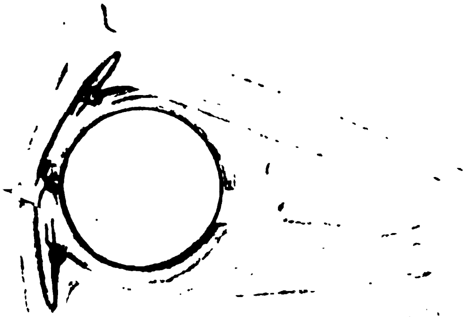
⑩

DIVIDING OPTIC NERVE



⑪

CUTTING TRIANGLES OUT OF SCLERA



⑫

SCHEMATIC SECTION SHOWS GOLD BALL INSERTED—WINDOW POSTERIORLY THROUGH SCLERA—OPTIC NERVE CUT — CONJUNCTIVA SEWED TO TENON'S CAPSULE, NOT OVER SCLERA

DIMITRY'S SUBSTITUTE FOR ENUCLEATION

the anterior window, and in such positions that a horizontal line bisecting the latter will also bisect the triangular openings. The gold ball is then inserted, and the sclera is sutured over its anterior surface. The conjunctiva is sutured to the capsule of Tenon at the position of its attachment to the sclera, and, hence, is not brought over the sutured anterior wound in the sclera. The operation is now complete.

The triangular openings are for the purpose of securing a more snug fit of the sclera over the ball; and the above manner of attaching the conjunctiva secures a firmer, and a larger area of curvature for the artificial eye. The recti muscles, having been left attached to the sclera, retain their ability to function; so that, what remains of the eye, with its implanted gold ball, is capable of practically the same scope of movement as was the eye before operation.

When the prothesis is inserted, it sits on a filled-in socket, is protected by lids which do not sag, and, on account of the larger cul-de-sac resulting from the retroattached conjunctiva, is capable of practically the same scope of movement as the normal eye. This combination constitutes a veritable camouflage.

The two original features of this operation, in which it differs from all similar operations, are the posterior window in the sclera, and the method of attaching the conjunctiva. The questions of sympathetic ophthalmia and extrusion of the gold ball will now be considered.

The two most widely accepted hypotheses to account for sympathetic iridocyclitis are perhaps that of Leber and Deutschmann, and that of Rimpler.

If the former theory is correct, and sympathetic ophthalmia is due to the infectious virus reaching the sound eye by way of the lymphatics of the optic nerve, unless the retained sclera is the focus of the infection, which is extremely improbable, the advocated operation protects from this untoward eventuality to the same extent as does enucleation, for the optic nerve is severed.

Those who are partial to the ciliQneural theory of Rimpler, that an irritation of the ciliary nerves of the eye first affected induces a susceptibility to the disease in the sound eye, will find it not difficult to sever these nerves at the same time the optic nerve is severed.

I have had no case of sympathetic ophthalmia following my operation, and, as stated, it is not my custom to sever the ciliary nerves.

Probably due to the posterior window in the sclera taking care of the exudates and small hemorrhages, or equalizing pressure, or both, I can report twenty (20) cases operated by my method without a single extrusion of the golden ball.

Eighteen (18) of these cases were operated under a general, and two (2) under a local anesthetic.

Two cases date back five years, 4 four years, 4 three years, 5 two years, and 5 one year. I have seen the great majority of these cases since the operation, and have still later communicated with most of them. My expectations of the operation have been fulfilled in every respect with each case; and, furthermore, while about half of these operations have been performed upon children, in not one instance have I yet noted anything even approaching an asymmetric development of the face.

Following the implantation of other substances in place of the gold ball, such as fat, cartilage, the eye of the rabbit, paraffin and dental wax, my results have been, on the whole, not satisfactory. Were it not for these investigations with the substances named above, I would be able to report many more cases of this operation at the present time.

Fat is quickly absorbed, as is the eye of the rabbit, altho not so rapidly. Paraffin and dental wax have given the poorest results, for they, and particularly the latter, cause a great deal of irritation. Cartilage, barring the great difficulty in procuring pieces suitably shaped for the purpose, seemed to give rather satisfactory results, but unfortunately I was unable to keep the two cases where it was employed under observation for a sufficient time to note final results. However, I can see in its use no advantage over the gold ball; in fact, rather the contrary.

In further defense of my stand, I shall quote from Allport, in The American Encyclopedia of Ophthalmology,[1] under the caption of Choice of Method in Eyeball Excision: "In the majority of cases this mutilating and deforming operation of enucleation is entirely unnecessary and should be relegated to obscurity, that it may make way for better, more modern and more humane surgical procedures."

In conclusion, the advantages of the operation may be summed up as follows:

(1) It may be performed with a comparative absence of trauma; and, hence, is followed by less reaction, less secretion and less ecchymosis, with less likelihood of injury to the sympathetic, than is the case after enucleation.[2]

(2) It furnishes a filled-in socket with its several advantages; a firm seat for the prothesis; an absence of sagging lids, and, hence, a normal lacrimal secretion and drainage.

(3) It evidently does not interfere with a natural face development in the young.

(4) It leaves the recti muscles undisturbed and with an unimpaired power to function.

(5) The posterior window permits of the easy severance of the optic nerve; it permits of ready absorption of hemorrhages and exudates, and obviates extrusion of the gold ball.

(6) The retroattachment of the conjunctiva furnishes a deeper retrotarsal fold permitting unrestricted excursions of the prothesis.

REFERENCES.

1. Allport, F. American Encyclopedia of Ophthalmology. v. 6, p. 4396.
2. Dimitry, T. J. Injury of the Sympathetic in Enucleation. Ophthalmic Record, v. 26, p. 183.

A TEST FOR THE JUDGMENT OF DISTANCE

Captain Harvey J. Howard, M. D., Oph. D.

PEKING, CHINA.

This paper reports the results of investigations carried on at the Medical Research Laboratory, Hazelhurst Field, Minneola, N. Y. It was read at the American Ophthalmological Society, June 16th, 1919. Authority to publish granted by Board of Publication, S. G. O.

The much discussed question of the judgment of distance has suddenly come to have, thru the advent of military and naval aviation, a very important and practical application. The literature on the subject is voluminous. One finds, however, that it is rich in the amount of theory from the physiologic, psychologic and philosophic viewpoints, but exceedingly meager in experimental data, most of which were published several decades ago. It is the practical phase and consequently the experienced data which most concern those of us interested in the examination and classification of applicants for the aviation service. We are eager to know how and why we are able to judge distance, but our chief object is to learn what the individual ability of men along this line actually is.

STATUS OF THE PRESENT TEST.

The test for the judgment of distance is referred to in our aviation manual as the test for "stereoscopic vision." For this purpose a hand stereoscope, with specially made sets of stereoscopic charts is used. In the majority of cases this test is satisfactory as far as it goes. But it does not permit of any except rough distinctions. No accurate classification, based on a subject's relative ability, is possible. Either he projects all of the pictures fairly accurately or he gets no projection at all. On this basis he is rated as "normal" or "not normal." Also, the ability to fuse stereoscopic pictures is impossible for some individuals who have very good judgment of distance. Artificially produced stereoscopy with them is an act wholly new in their experience; the harder they try the more confused they become. Some finally learn the trick, others never do, so it is safe to assume that among the applicants who were excluded on account of this technical inability there must have been some who had good judgment of distance and consequently were unjustly debarred from the service. Nor does the stereoscopic test preclude the possibility of an over zealous applicant having learned the respective positions of the objects in the picture prior to his examination. Indeed, such an explanation is the least critical and perhaps the most ethical way of accounting for a number of cases of faulty binocular vision recently found among the flyers, especially since all the evidence pointed to the fact that this was not a recent condition.

On the grounds that there are flyers now in the service with faulty binocular vision and a few with only monocular vision, some examiners have questioned the absolute necessity of binocular single vision as a preliminary requirement. Upon sober reflection, however, one must conclude that the knowledge that a number of men with faulty binocular vision have been admitted to flying service and are still living, does not constitute a proof that even a larger number have not met an unnecessary death on account of having been wrongly permitted to fly. It is error in judgment of distance in landing a plane that has caused the great majority of deaths among cadet aviators. The Manual of the Medical Research Laboratory, 1919, in discussing this subject says, "Speaking of error of judgment in flying as a cause of aeroplane accidents, Anderson states that this accident may occur in getting off the ground, in the air, or when landing. To 58 crashes in the 'V' series, this accounted for 42, 4 in getting off the ground and 38 in landing." It is impossible to make post-mortem confirmation of the binocular vision of those unfortunate flyers, but it seems logical to insist on a safe-guard that seems so obviously necessary.

In view of the criticism of the hand stereoscope as a satisfactory test for the judgment of distance, it fell to my lot to find or devise a test which would be free from that criticism. In order to undertake the subject with the proper background it has been necessary to go into the subject of the judgment of distance rather fully. I shall endeavor, then, to give a brief summary of that subject with reasons for deciding upon a certain form of apparatus which seemed to fulfill the requirements which I sought and had the added advantage of being extremely simple in construction.

FACTORS INVOLVED IN JUDGMENT OF DISTANCE.

Judgment of distance is dependent upon several factors. Some of these factors operate for both monocular and binocular vision alike. The others act only when binocular single vision is present. In brief, the latter possesses all the factors that monocular vision has, and in addition has at least two others. The distinctions may be represented as follows:

A. Factors common to both binocular and monocular vision:

1. Size of the retinal image.
2. Accommodation.
3. Motion parallax.
4. Terrestrial association.
   (a) Linear perspective.
   (b) Overlapping of contours.
   (c) Light reflections and shadows.
5. Aerial perspective, i. e., the changes with respect to color, brightness and contrast which distant objects undergo on account of variations

in the clarity of the intervening atmosphere.

B. Factors operating only with binocular single vision:

1. Binocular parallax.
2. Convergence.

In employing a test for the purpose of classification it is necessary to utilize only that factor or those factors which operate to make for an individual difference in ability. All other factors should be eliminated in such a test. Is it possible to isolate and thereby examine the factor showing the most individual characteristic? The following argument should answer this question:

Motion parallax is produced either by movement of the observer or by objects within his field of vision. For that reason it may be considered an artificial factor employed only to enhance the already existing facility. It should, therefore, be eliminated as a factor not related either to innate or to acquired individual ability.

Factors external to ourselves which assist all of us equally, such as terrestrial association and aerial perspective should also be eliminated for the same reason.

Factors which operate only for short distances and either not at all, or only very slightly for distances of six meters and over, do not need to be considered when examining prospective aviators. Therefore, accommodation and convergence should be eliminated.

The two remaining factors are the binocular parallax and the size of the retinal image. It is possible to obtain the relative values of these two factors by using the same test apparatus, first with two eyes and then with only one eye. In the first instance both factors may operate together; in the second instance the binocular parallax is eliminated and only the size of the retinal image can operate. This latter is practically as important a factor with one eye as it is with two. If by comparison it be found on the one hand that the results are the same or approximately the same, it is obvious that the size of the retinal image which operated in both tests, is the important factor. If, on the other hand, it be found that the binocular test produces a far more delicate discrimination than the monocular, we are forced to the conclusion that the binocular parallax is the more important factor and the size of the retinal image is negligible or practically so. The results of just such tests were obtained and have been tabulated in this report and conclusions deduced therefrom.

It may be wise at this point to correct what may result in an erroneous impression from the foregoing statements. There has been no intent to belittle the other factors to the advantage of the binocular parallax and the retina image. These other factors must play a very important part in judging distance properly. It may be that taken as a whole, they assist us as much as the factors specially referred to. It may also be true that our experience teaches us to use these factors more and more, especially when suddenly deprived of the binocular parallax thru the loss of an eye, but it must be maintained that except for convergence and accommodation they are factors extraneous to the individual and do not represent that difference in ability characteristic of him. In addition they are not constant but vary greatly with atmospheric changes and environment, whereas binocular parallax is subject to no variation per se.

THE PROBLEM OF A SUITABLE APPARATUS.

The problem, therefore, was to devise an apparatus which would eliminate all factors except the binocular parallax and the retinal image. The test should also permit of our common every day method of depth perception without interposing the feat of fusing stereoscopic pictures. The apparatus then should be employed at a distance of at least six meters. The test should be as conventional as possible and simple, and should permit of fine discrimination. Finally to avoid the possibility of motion parallax a head rest should be used.

In searching the literature I was fortunate in finding the description of an apparatus devised by Brooksbank James,* of England, in 1908. With a few modifications and the addition of a head rest this seemed to meet all the requirements.

DESCRIPTION OF THE APPARATUS.

The framework consists of three sides of a box, the back, the bottom and the front. The inside measurements of the front and back are 58 cm. high and 75 cm. wide; the floor is 55 cm. from front to back and 75 cm. wide.

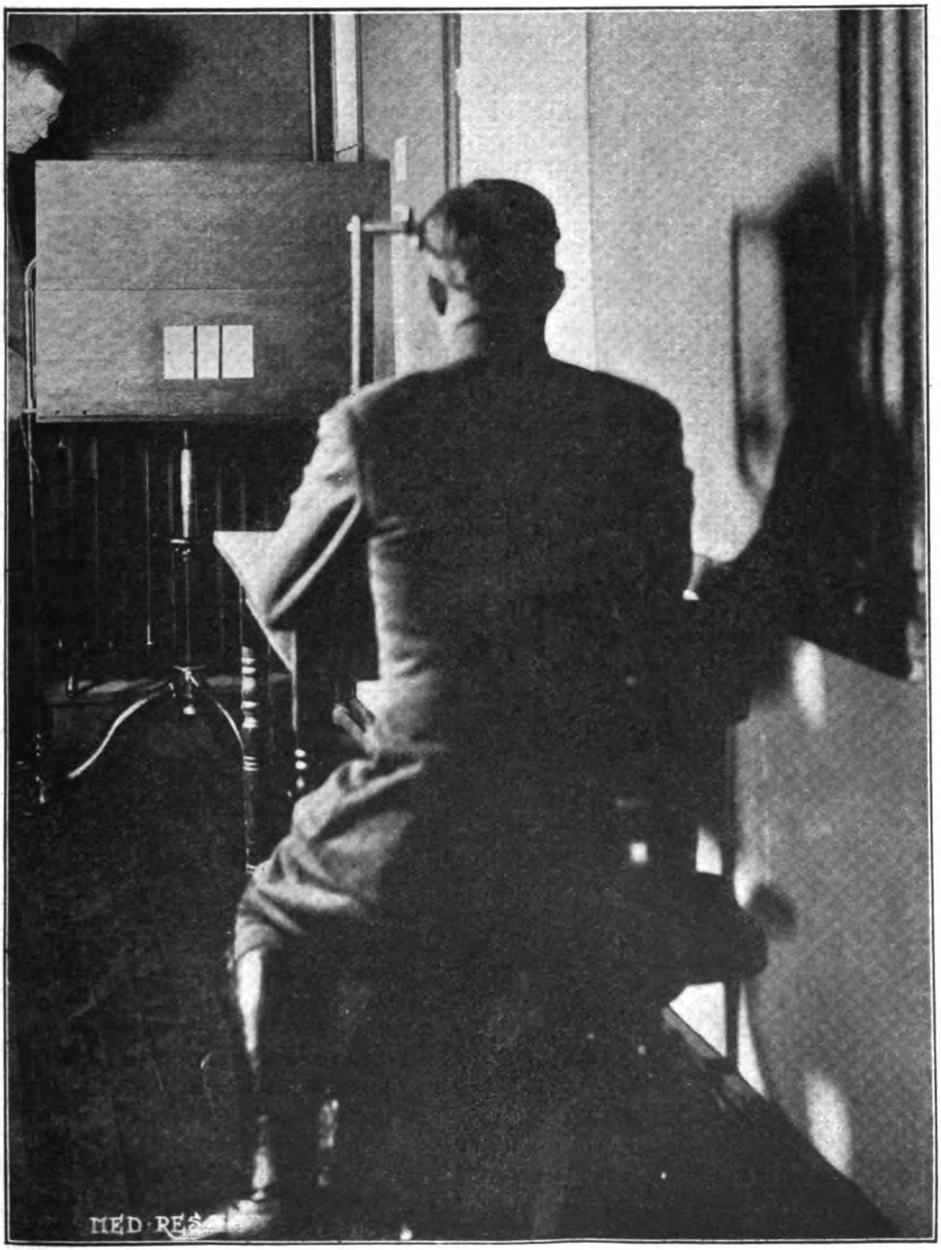


Fig. 1. A subject making an observation.

---

*"Measurement of Stereoscopic Visual Acuity," Lancet, June 20, 1908, p. 1763.

The anterior and posterior surfaces of the front partition and the floor are painted a dead black. The anterior surface of the back partition is covered with a sheet of dead white cardboard. In the middle of the front partition a window is cut 20 cm. wide and 12 cm. high. The upper margin is 38 cm. from the top of partition.

Extending from front to back a board 12 cm. wide and 2 cm. thick is permanently fixed over the center of the floor. Before being fixed, this board is marked off with a scale 0.5 cm. apart. Two parallel lines 6.0 cm. apart are also drawn the length of the board. Where the scale and parallel lines cross small holes are bored with an electric drill. The holes are made for the purpose of carrying upright wooden rods or dowels. There rods, which are 1.0 cm. in diameter and 26 cm. long are smoothed with sand paper, painted black, and carefully modeled at one end to fit into the holes.

The rods are illuminated by indirect light from the white surface of the background. The source of light is a 75 watt nitrogen lamp carried by a flexible goose neck attached to a floor stand. The lamp is set about 20 cm. in front of the back partition near to the top of the apparatus but low enough to be hidden from the view of the subject to be examined. A Hubbell aluminum reflector casts the light rays onto the white background at an angle of 45 degrees.

A cardboard screen is placed behind the window to prevent the observer from watching the operator adjust the rods. The latter stands at the left side of the apparatus which is placed upon a table adjustable to any required height.

The only remaining apparatus is a Trolland headrest attached by a clamp to the edge of a table six meters in front of the box.

METHOD OF EXAMINATION.

The test is carried out in the dark room with the source of light as indicated above. The subject or observer is seated in a chair with his head securely but comfortably fixed in the headrest. (See Fig. 1.) The apparatus is adjusted so that the eyes of the observer are exactly six meters from the zero mark or middle of the cross scale on the rod carrying board. Adjustment is also made so that the observer's eyes are at the same height as the middle of the window. This latter precaution is necessary to avoid any chance of linear perspective entering in. Therefore, when the rods are placed in position and the screen lifted neither the bottoms nor the tops of the rods are visible, but only the middle one-half or thereabouts.

When everything is ready the observer is told to fix a point near the center of the screen. The screen is suddenly giving practically an instantaneous view of the rods. The observer is required to state which of the two black rods is nearer to him, the right or the left. He is informed at the beginning of the test that at no time will the rods be set in the same reference plane, i. e., they will not be equidistant from his eyes. His judgment is therefore, reduced to the simplest terms, viz., which rod is the nearer. At the same time all effort is made to deceive him as to the relative positions of the rods. A pack of 20 blank playing cards are lettered, ten of them "right" and ten of them "left." These cards are shuffled before the judgments are taken at each station, and the positions of the rods determined in the order indicated by the cards.

Twenty judgments are taken at each of five stations. As a rule the first station observed represents the 30 mm. depth difference, i. e., when one rod is in a reference plane 6,000 mm. away from his eyes and the other 6,030. If the twenty judgments are all correct, the observer is tried successively at the 20 mm., the 15 mm., the 10 mm., and the 5 mm. stations or until it is apparent by the number of wrong judgments that he is merely guessing or actually projects the farther rod nearer than the other. If the judgments at the 30 mm. station are not all correct the observer is tried at the 40 mm., the 50 mm., the 60 mm., and the 90 mm., stations, etc., i. e., until his judgments are all correct.

EXPLANATIONS OF TERMS AND DIAGRAMS.

When we look at two objects to compare their relative distance we make our judgment by the difference in their distances from us. In Figure 2, A and B represent the two eyes and O and O¹ the two objects respectively. The two distances may be represented by imaginary lines, one from O and the other from O¹ to a point midway between the two eyes, that is, to an imaginary cyclopean eye. These distances may be compared with less difficulty by using a more diagrammatic drawing. Let us therefore, consider one eye B and the two objects O and O¹ in a straight line as in Figure 3. In this Figure let

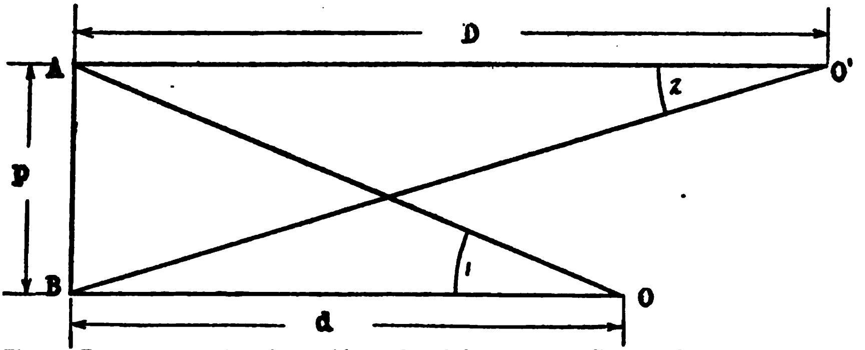


Fig. 2. True representation of two objects, O and O¹ at unequal distnaces from the eyes, A and B.

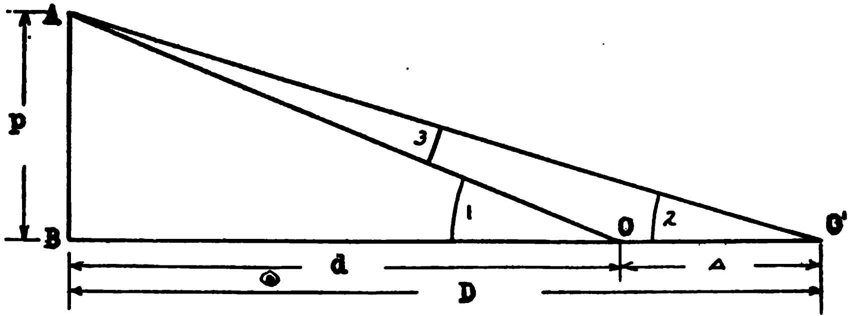


Fig. 3. Diagrammatic representation of Fig. 2.

p=AB, the interpupillary distance
d=BO, the shorter distance
D=BO¹, the longer distance
D—d=Δ, the difference in distance or as it is termed in this paper, the *depth difference*.

Also let $\angle 1 = \angle AOB$, the angle of convergence upon the near object; and $\angle 2 = \angle AO^1B$, the angle of convergence upon the far object; and $\angle 3 = \angle OAO^1$

Then $\angle 1 - \angle 2 = \angle 3$, which is the binocular parallactic angle represented by the depth difference D—d or Δ.

For small angles like angles 1, 2 and 3, the sine, the tangent and the angle in radians may be considered equal with negligible error.

Let r=angle 3 in radians.

then tan. of angle 1 $= \frac{p}{d}$ and tan. of angle 2 $= \frac{p}{D}$ and $r = \frac{p}{d} - \frac{p}{D} = p\,\frac{D-d}{Dd}$

But when p=0.063 meters, and d and D are 6.000 and 6.005 meters respectively, then by substitution

$$r = .063 \, \frac{.005}{6.000 \times 6.005} = 0.00000874,$$

which represents the binocular parallactic angle in radians.

In order to convert radians to degrees of arc we must multiply radians by $\frac{180}{\pi}$ and then this result in degrees by 3600 to obtain the final result in seconds of arc.

Therefore 0.00000874 radians= 1.803″.

This angle 1.803″ is the binocular parallactic angle when the interpupillary distance is 63 mm., the depth difference 5 mm., and the distance of the nearer object 6 meters.

On the basis of this formula, the binocular parallactic angles were worked out for interpupillary distances ranging from 57 to 72.5 mm. and for depth differences ranging at regular intervals from 5 to 360 mm. (See Table I.)

RESULTS OF THE TEST.

One hundred and six subjects or observers, seventy-five of whom were aviators, were examined with the apparatus. Prior to the test other visual data were recorded, such as: age, army service, hours of flying if any, vision, muscle balance, near points of convergence and accommodation, and interpupillary distance.

The classification of a subject is not made on the basis of the shortest depth difference at which he gives twenty consecutive correct judgments, but rather upon the shortest depth difference at which he is still at or within his threshold, i. e., when at a certain station the subject makes 15 correct and 5 wrong judgments, the calculation may be made as follows: The 5 wrong judgments may be classified as guesses. To offset these 5 correct judgments should be eliminated also as guesses. That leaves 10 correct judgments which represents the number which the subject actually distinguishes, i. e., just 50% of the total number of 20. I have accepted therefore, as the threshold of any individual, that least depth difference at which his judgments are correct not less than 75% of the time.

The ability of the 106 observers varied greatly. It was found convenient to classify them into twelve groups based upon their depth-difference thresholds. This classification with all correlating data has been recorded in Tables II to VII.

It was found that fourteen men had judgment of distance to a remarkable degree. According to a formula expressed above, their respective binocular parallactic angles depend not only upon their depth difference threshold, but also upon their interpupillary distance. Their depth-difference thresholds were as small as 5 mm. Their interpupillary distances varied from 63 to 72.5 mm. It is obvious that the man having the smallest interpupillary distance would have the smallest binocular parallactic angle. By referring to Table II we find that the smallest interpupillary distance 63 mm. represents a binocular parallactic angle of 1.80″. The longest interpupillary distance 72.5 mm., represents an angle of 2.07″. This difference in angle of 0.27″ denotes an advantage of about 15% that the man with the longest has over the man with the smallest interpupillary distance, i. e., their actual ability is the same but the latter observer with the 63 mm. interpupillary distance must have a threshold angle of not more than 1.80″ in order to equal the discriminating ability possessed by the 2.07″ angle of the man with the interpupillary distance of 72.5 mm.

The parallactic angle of the remaining twelve observers in Class A ranged between 2.07″ and 1.80″. The average threshold for the entire fourteen men was 1.89″.

Class B, Table III, represents a group of thirty men with a threshold of 10 mm. and a binocular parallactic angle averaging 3.67″. Class C, Table IV, represents a group of fifteen men with a threshold of 15 mm. and an average angle of 5.5″. Class D, Table V, is a record of a group of twenty-three men with a threshold of 20 mm. and an average parallactic angle of 7.30″. The remaining eight classes, E to M, recorded in Tables V-VII, were determined by the depth-difference thresholds ranging from 30 to 360 mm. These thresholds represent parallactic

TABLE I. BINOCULAR PARALLAX IN TERMS OF SECONDS OF ARC.

Inter p. d. in mm.	Depth difference in millimeters when the nearer distance is 6000 mm.; e. g., 5 mm. represents the second object at 6005 mm.																		
	5	10	15	20	25	30	35	40	50	60	90	120	150	180	210	240	270	300	330	360
57.0	1.628"	3.255"	4.880"	6.505"	8.128"	9,737"	11.349"	13.005"	16.178"	19.389"	28.945"	38.405"	47.775"	57,054"	66.242"	75.343"	84.357"	93.286"	102.131"	110.893"
57.5	1.645	3.289	4.931	6.572	8.205	9.833	11.462	13.089	16.339	19.569	29.210	38.755	48.210	57.572	66.839	76.024	85.115	94.120	103.041	111.878
58.0	1.662	3.322	4.975	6.624	8.273	9.919	11.563	13.208	16.478	19.739	29.463	39.091	48.627	58.069	67.420	76.682	85.855	94.942	103.943	112.855
58.5	1.676	3.343	5.010	6.676	8.341	10.004	11.663	13.314	16.615	19.909	29.717	39.427	49.044	58.567	67.998	77.338	86.589	95.752	104.829	113.822
59.0	1.687	3.372	5.056	6.738	8.419	10.090	11.760	13.429	16.762	20.080	29.972	39.766	49.466	59.072	68.585	78.006	87.335	96.576	105.723	114.795
59.5	1.703	3.405	5.105	6.798	8.487	10.175	11.862	13.546	16.905	20.249	30.225	40.102	49.884	59.570	69.163	78.664	88.074	97.395	106.628	115.775
60.0	1.720	3.435	5.143	6.850	8.557	10.261	11.954	13.660	17.080	20.420	30.480	40.440	50.304	60.071	69.744	79.324	88.812	98.210	107.519	116.741
60.5	1.728	3.455	5.181	6.905	8.623	10.350	12.058	13.767	17.183	20.589	30.764	40.775	50.763	60.575	70.325	79.986	89.553	99.029	108.514	117.712
61.0	1.745	3.488	5.230	6.971	8.702	10.431	12.160	13.886	17.333	20.759	30.987	41.113	51.141	61.076	70.906	80.646	90.293	99.848	109.313	118.735
61.5	1.767	3.527	5.276	7.029	8.777	10.528	12.266	14.010	17.477	20.936	31.246	41.457	51.567	61.579	71.494	81.312	91.039	100.672	110.214	119.757
62.0	1.776	3.545	5.312	7.077	8.842	10.604	12,361	14.112	17.610	21.103	31.498	41.789	51.981	62.075	72.075	81.970	91.775	101.487	111.107	120.635
62.5	1.786	3.571	5.354	7.137	8.916	10.686	12.456	14.224	17.751	21.268	31.746	42.121	52.396	62.570	72.646	82.626	92.514	102.299	111.992	121.603
63.0	1.803	3.605	5.405	7.197	8.986	10.774	12.560	14.344	17.899	21.441	32.003	42.462	52.819	63.075	73.232	83.291	93.254	103.122	112.897	122.579
63.5	1.819	3.635	5.448	7.250	9.056	10.860	12.663	14.457	18.038	21.564	32.241	42.754	53.192	63.529	73.766	83.905	93.946	103.902	113.745	123.505
64.0	1.832	3.658	5.482	7.306	9.119	10.940	12.756	14.565	18.180	21.780	32.509	43.133	53.654	64.072	74.390	84.609	94.730	104.754	114.684	124.520
64.5	1.844	3.688	5.530	7.370	9.200	11.029	12.857	14.682	18.325	21.949	32.763	43.471	54.074	64.576	74.974	85.275	95.473	105.577	115.581	125.497
65.0	1.861	3.721	5.574	7.423	9.270	11.116	12.960	14.800	18.465	22.122	33.021	43.813	54.499	65.080	75.558	85.936	96.214	106.395	116.480	126.470
65.5	1.877	3.746	5.612	7.478	9.342	11.204	13.058	14.909	18.606	22.294	33.273	44.145	54.912	65.574	76.134	86.592	96.951	107.210	117.373	127.439
66.0	1.886	3.771	5.654	7.536	9.414	11.284	13.154	15.021	18.751	22.458	33.523	44.479	55.330	66.074	76.716	87.254	97.692	108.029	118.272	128.415
66.5	1.902	3.804	5.704	7.595	9.484	11.371	13.257	15.140	18.891	22,631	33.781	44.822	55.756	66.581	77.300	87.917	98.433	108.848	119.166	129.386
67.0	1.919	3.835	5.743	7.650	9.556	11.459	13.361	15.252	19.032	22.805	34.038	45.157	56.171	67.077	77.879	88.576	99.172	109.666	120.062	130.359
67.5	1.930	3.857	5.781	7.705	9.627	11.542	13.452	15.361	19.174	22.969	34.284	45.488	56.586	67.575	78.458	89.237	99.912	110.486	120.958	131.331
68.0	1.944	3.888	5.829	7.769	9.699	11.627	13.554	15.479	19.318	23.140	34.541	45.826	57.011	68.076	79.042	89.899	100.651	111.302	121.852	132.302
68.5	1.962	3.922	5.875	7.824	9.771	11.715	13.659	15.597	19.460	23.315	34.802	46.150	57.429	68.580	79.623	90.560	101.393	112,123	122.752	133.280
69.0	1.978	3.946	5.913	7.878	9.841	11.802	13.755	15.705	19.595	23.483	35.049	46.502	57.845	69.079	80.199	91.219	102.135	112.941	123.646	134.249
69.5	1.987	3.972	5.955	7.936	9.913	11.883	13.851	15.818	19.744	23.649	35.301	46.833	58.267	69.582	80.784	91.879	102.869	113.755	124.538	135.219
70.0	2.003	4.005	6.004	7.995	9.984	11.970	13.955	15.938	19.885	23.823	35.561	47.180	58.686	70.081	81.365	92.542	103.612	114.578	125.440	136.200
70.5	2.019	4.035	6.043	8.055	10.055	12.058	14.057	16.048	20.027	23.996	35.812	47.513	59.103	70.581	81.948	93.207	104.355	115.395	126.333	137.167
71.0	2.031	4.057	6.082	8.105	10.126	12.140	14.150	16.158	20.169	24.144	36.062	47.848	59.525	71.082	82.526	93.861	105.088	116.209	127.225	138.137
71.5	2.044	4.087	6.128	8.167	10.197	12.225	14.251	16.276	20.310	24.331	36.320	48.190	59.942	71.580	83.106	94.523	105.831	117.032	128.127	139.113
72.0	2.062	4.121	6.175	8.223	10.269	12.314	14.357	16.392	20.453	24.502	36.577	48.525	60.362	72.083	83.693	95.191	106.574	117.850	129.020	140.085
72.5	2.077	4.146	6.212	8.277	10.340	12.401	14.452	16.501	20.595	24.673	36.826	48.860	60.781	72.586	84.271	95.845	107.309	118,665	129.904	141.058

Note.—Each increase of 1 mm. in interpupillary distance gives an advantage of about 1.6%; i. e., the man with the 72.5 p. d. has an advantage of 15% over the man with the 63 mm. p. d.

angles ranging from 10.6" to 136.2" (2' 6.2").

THE BINOCULAR FINDINGS.

When we turn our attention to the question of determining the causes for the great difference in the binocular parallax as an individual factor we must refer to the other data such as visual acuity, muscle balance, etc. The tests which provided this data were carefully made by one examiner and the results obtained checked by another. All visual tests were made under the same condition of surface brightness and illumination. Ocular muscle balance was determined by the screen and parallax tests. The near point of convergence was taken from a vertical plane through the anterior foci of the two eyes but the record was corrected to read from the center of rotation of the eyeballs by adding 25 mm. to the first finding. The interpupillary distance was measured in millimeters by the infinity method, i. e., when the visual axes were parallel.

The results of the tests for the near point of accommodation, however, are unreliable because unfortunately they were obtained subjectively and as a consequence many of the findings are absurdly small. When we are reminded that the observers were all endeavoring to make their maximum showing it is easy to understand why a test for accommodation under such circumstances should not be subjective. Fortunately the other findings provide sufficient reasons for the individual difference in classification.

In examining the data of Class A we find not only a very high visual acuity but also, except for two cases, a perfect symmetry of visual acuity. The difference exhibited by the two exceptions is only that between 20/10 and 20/10— for one, and 20/15 and 20/15+ for the other. The average visual acuity of the fourteen men was 20/15+ in each eye. The lowest visual acuity was 20/20 O. U., which was found only in one observer. None of the men had ever worn a correction. Tests for muscle balance for distance revealed no hyperphoria. Eight men had orthophoria, and the other six from ½ to 3 prism diopters of esophoria. There was none with exophoria. The near point of convergence ranged from 63 to 100 mm. with an average of 83 mm., which is fully normal. The interpupillary distance averaged 66.14 mm., which is over the average. In brief, there were very high visual acuity, practically perfect visual symmetry and perfect muscle balance. These findings are the more significant after we examine the data of the other classes.

In Class B we find a little less visual acuity, more visual asymmetry and a few men with corrections; also a number of observers with small degrees of exophoria and with some hyperphoria; also a few men with a weak convergence for near. The interpupillary distance averaged about 2 mm. less than in Class A.

The other classes, C to M (See Tables IV to VII), show on the whole a steadily decreasing visual acuity and visual symmetry, more subjects wearing corrections and more cases of muscle imbalance.

There was another phenomenon. It was found that some men projected one rod nearer when actually it was the farther. This tendency began to show even in Class B, but became quite common in the lower classes. With some it appeared to be connected with a difference in the visual acuity of the two eyes. With others it seemed to be associated with some latent vertical or lateral deviation. Finally it appeared in a few observers to be the sole cause in reducing their power to judge distance. There was no uniformity as to the false projection of either the right or the left rod; one man might persistently project the left rod nearer and another man follow him immediately and strongly project the right rod nearer. It, therefore, cannot be explained by some fault in the method of testing. In fact there seems to be no adequate explanation of this phenomenon.

TABLE II. CLASSIFICATION OF OBSERVERS ACCORDING TO THEIR BINOCULAR PARALLACTIC ANGLE

Class A. (Those whose threshold is represented by a depth difference of 5 mm.)

										Correct judgment in 20 trials						
										*Depth Differences:						
No.	Name.	Age.	Army Service.	Hours Flying	Vision	Muscle Balance.	N.P. Accom.	N.P. Conv.	Inter P.D.	30 mm.	20 mm.	15 mm.	10 mm.	5 mm.	Per cent Correct at 5 mm.	Binocular Parallactic Angle.
1.	W. O'T.	19	Chauffer Med. Dept.	....	R.20/10 L.20/10	Orth	85	65	63	20	20	20	20	15	75	1.803"
2.	C. B. W.	26	Aerial Observer	180	R.20/15+ L.20/15+	Eso 1½	120	63	63.5	20	20	20	20	16	80	1.819"
3.	O. A. B.	41	Med. Corps	....	R.20/15 L.20/15	Orth	150	70	63.5	20	20	20	18	16	80	1.819"
4.	T. L. O.	25	Pilot	150	R.20/10 L.20/10—	Eso ½	145	80	63.5	20	20	20	20	15	75	1.819"
5.	S. A. P.	28	Pilot	65	R.20/15— L.20/15—	Orth	120	95	64	20	20	20	18	16	80	1.832"
6.	A. H.	21	Pilot	60	R.20/15 L.20/15	Eso ½	100	95	66	20	19	18	18	17	85	1.886"
7.	S. V. T.	26	Pilot	100	R.20/15+ L.20/15+	Orth	110	95	66	20	20	19	18	16	80	1.886"
8.	D. R. S.	26	Pilot	300	R.20/15 L.20/15	Orth	R.115 L.105	65	66	20	19	18	18	15	75	1.886"
9.	W. R. D.	27	Pilot	500	R.20/20 L.20/20	Eso ½	90	90	66	20	20	19	20	15	75	1.886"
10.	J. N. L.	25	Pilot	150	R.20/10— L.20/10—	Orth	105	93	67	20	20	20	18	18	90	1.919"
11.	R. W. E.	23	Pilot	140	R.20/10— L.20/10—	Orth	97	75	67	20	19	19	19	16	80	1.919"
12.	W. A. B.	22	Pilot	200	R.20/15 L.20/15+	Eso 3	65	100	69	20	20	20	16	18	90	1.978"
13.	L. B. C.	21	Pilot	150	R.20/15— L.20/15—	Orth	95	100	69	20	20	20	19	17	85	1.978"
14.	O. G. H.	21	Pilot	400	R.20/20 L.20/20	Eso 1½	95	75	72.5	20	20	20	17	15	75	2.077"
	Average	25			O.U.20/15+	Eso ½	106	83	66	..	..	..	..	..	80	1.893"

TABLE III. CLASSIFICATION OF OBSERVERS CONTINUED.
Class B. (Those whose threshold is represented by a depth difference of 10 mm.)

No.	Name.	Age.	Army Service.	Hours Flying.	Vision	Muscle Balance.	N.P. Accom.	N.P. Conv.	Inter P.D.	Image Projected Nearer	Correct judgments in 20 trials — Depth Differences — 30 mm.	20 mm.	15 mm.	10 mm.	5 mm.	Per cent Correct at 10 mm.	Binocular Parallactic Angle	Remarks.
15.	C. B.	13	School Boy	....	R.20/15+ L.20/15+	Eso 1	90	60	57	......	20	20	17	16	11	80	3.255"	
16.	J. N. B.	44	Med. Corps	....	R.20/15 L.20/15	Orth	375	80	59.5	......	20	20	17	18	8	90	3.405"	
17.	Thom.	33	Pilot	250	R.20/15 L.20/15	Orth	150	90	60	......	19	16	15	15	12	75	3.435"	
18.	L. P. K.	29	Pilot	250	R.20/15— L.20/15—	Eso 1	90	105	61	Left	20	17	15	16	9	80	3.488"	Tendency to project L. rod nearer when the two rods are in same plane.
19.	H. L. L.	31	Pilot	175	R.20/10— L.20/10	Orth	75	96	62	......	20	20	20	17	8	85	3.545"	
20.	D. L. J.	23	Pilot	50	R.20/20 L.20/20	Orth	85	75	62	......	20	18	18	15	10	75	3.545"	
21.	A. R. T.	23	Pilot	75	R.20/10 L.20/10	Orth	115	90	62.5	......	20	20	19	19	10	95	3.571"	
22.	L. C. A.	22	Pilot	50	R.20/15 L.20/15	Exo 1	80	75	62.5	......	20	17	19	18	12	90	3.571"	
23.	H. H.	24	Pilot	80	R.20/15— L.20/15—	Eso ½	100	95	63	......	20	20	17	19	11	95	3.605"	
24.	G. A. B.	22	Pilot	400	R.20/15 L.20/10	Exo 1½	73	88	63	......	20	17	17	17	10	85	3.605"	
25.	R. W. S.	25	Pilot	200	R.20/15+ L.20/15+	Exo 1½	95	90	63	......	20	18	19	16	8	80	3.605"	
26.	J. C. R.	23	Pilot	500	R.20/15 L.20/15	Orth	107	85	63	......	20	20	20	17	13	85	3.605"	
27.	G. C. F.	22	Pilot	31	R.20/15 L.20/15	Orth	98	100	63	......	20	20	15	16	14	80	3.605"	
28.	H. C. S.	25	Pilot	140	R.20/15— L.20/15—	Exo ½	105	125	63	......	20	20	20	15	7	75	3.605"	
29.	J. T. D.	23	Med. Corps	....	R.20/15+ L.20/15—	Exo 1	90	75	63.5	......	20	19	18	16	8	80	3.635"	Wearing moderate myopic correction. Vision excellent and practically equal.
30.	C. T. F.	23	Pilot	200	R.20/15 L.20/15	Eso ½	R 130 L 115	65	64.5	......	20	20	17	18	10	90	3.688"	
31.	P. W. C.	45	Med. Corps	....	R.20/15 L.20/15	Exo ½ L.H. ½	325	100	64.5	......	20	20	18	15	12	75	3.688"	Wearing mixed astigmatic correction. Vision excellent and symmetrical.
32.	J. H. Mc.	26	Pilot	70	R.20/15— L.20/15	Eso ½	110	95	65	Right	20	20	20	17	8	85	3.721"	Tendency to project R. rod nearer when the two rods are in same plane.
33.	E. G.	26	Pilot	95	R.20/20 L.20/20	L.H. 1	92	82	65	......	20	18	15	16	12	80	3.721"	
34.	W. C. S.	26	Pilot	90	R.20/15 L.20/15	Orth	95	85	65.5	......	20	20	17	19	9	95	3.746"	
35.	H. Mac.	23	Pilot	100	R.20/15 L.20/15	Eso 2 R. H. ½	120	100	66	......	20	19	18	19	11	95	3.771"	
36.	H. C.	27	Pilot	70	R.20/15 L.20/15	Orth	100	70	66	......	20	20	20	15	13	75	3.771"	
37.	W. S. R.	24	Pilot	100	R.20/15 L.20/15	Orth	105	85	66.5	......	20	19	17	16	12	80	3.804"	
38.	C. L. P.	23	Pilot	50	R.20/15 L.20/15	Orth	95	110	67	......	20	20	19	16	7	80	3.835"	
39.	B. B.	22	Pilot	250	R.20/15 L.20/15	Eso 1	97	85	67	Left.	20	20	15	15	8	75	3.835"	Tendency to project L. rod nearer when the two rods are in same plane.
40.	E. H.	33	Med. Corps	....	R.20/20 L.20/15	Orth	165	115	67	......	20	20	16	15	9	75	3.835"	
41.	J. M. W.	39	Med. Corps	....	R.20/15 L.20/15	Exo 3	140	60	67	......	18	19	18	15	12	75	3.835"	Wearing myopic correction. Vision excellent and symmetric.
42.	A. W. M.	23	Pilot	300	R.20/15 L.20/10—	Eso 2	70	85	69	......	20	19	19	17	12	85	3.946"	
43.	T. J. V.	24	Pilot	300	R 20/20— L.20/10—	Exo ½	75	65	70	......	20	20	16	15	11	75	4.005"	
44.	W. K. D.	22	Pilot	185	R.20/15— L.20/15	Eso ½	96	85	71	Right	20	18	17	15	5	75	4.057"	Tendency to project R. rod nearer when the two rods are in same plane.
	Average	26.2			O.U.20/15	Orth	118	87	64.3	......	..	..	..	..	..	82.2	3.678"	

TABLE IV. CLASSIFICATION OF OBSERVERS CONTINUED.

Class C. (Those whose threshold is represented by a depth difference of 15 mm.)

No.	Name.	Age.	Army Service.	Hours Flying.	Vision.	Muscle Balance.	N.P. Accom.	N.P. Conv.	Inter P.D.	Image Projected Nearer	Correct judgments in 20 trials — Depth Differences 40 mm.	30 mm.	20 mm.	15 mm.	10 mm.	Percent Correct at 15 mm.	Binocular Parallactic Angle	Remarks.
45.	H. J. H.	39	Med. Corps	....	R.20/10 L.20/10	Eso ½	145	70	59	......	20	20	20	15	10	75	5.056"	Wearing high correction for compound hyperopic astigmatism.
46.	J. D. C.	23	Pilot	125	R.20/15 L.20/15	Orth	142	100	60	......	20	16	19	15	11	75	5.143"	
47.	P. A. W.	26	Pilot	15	R.20/15 L.20/20	Orth	102	92	61	Right	20	18	16	16	12	80	5.230"	Wearing high mixed astigmatic correction.
48.	E. B. G.	38	Med. Corps	....	R.20/15 L.20/15	Eso 2	145	60	62.5	......	20	20	20	16	14	80	5.354"	Projects R. rod nearer. Vision better in right eye.
49.	E. L. H.	24	Pilot	200	R.20/15 L.20/10	Exo 1	R 110 L 102	100	64	Left	20	17	18	16	13	80	5.482"	Projects L. rod nearer. Vision better in left eye.
50.	H. M. J.	34	San. Corps	....	R.20/15 L.20/15	Orth	150	95	64.5	......	20	20	17	16	11	80	5.530"	See note below.
51.	L. H. B.	31	Med Corps	....	R.20/15 L.20/15	R.H. ½	150	108	64.5	......	20	20	20	15	13	75	5.530"	Convergence power below normal.
52.	C. K.	23	Med. Corps	....	R.20/15 L.20/15	Exo 1½	R 90 L100	85	65	......	20	20	18	18	9	90	5.574"	Wearing correction for compound myopic astigmatism.
53.	E. L. S.	22	Pilot	100	R.20/15 L.20/15	Eso 1	95	85	66	......	20	20	18	17	13	85	5.654"	Projects left rod nearer.
54.	W. G. B.	23	Pilot	100	R.20/15 L.20/15	Eso ½	90	100	66	......	20	20	20	16	11	80	5.654"	Excessive exophoria for near.
55.	E. A. B.	28	Pilot	200	R.20/15 L.20/15	Eso ½	110	90	66	Left.	20	20	20	15	13	75	5.654"	
56.	E. W. K.	27	San. Corps	....	R.20/15 L.20/15	Exo 1 Exo' 12	130	90	66	......	20	20	19	15	13	75	5.654"	
57.	W. S. P.	26	Pilot	150	R.20/15 L.20/15	Eso 1	115	95	67	......	20	20	19	16	9	80	5.743"	
58.	R. W. P.	23	Pilot	200	R.20/15 L.20/15	Eso ½	120	130	68	......	20	19	19	16	11	80	5.829"	Has weak convergence.
59.	H. W. R.	24	Pilot	150	R.20/30 L.20/30	Eso ½	70	65	70	......	20	15	16	16	10	80	6.004"	Thinks his low vision due to excessive smoking.
	Average	27.4			R.20/15 L.20/15	Eso 1/5	118	91	65.6	......	..	..	..	..	..	79.3	5.540"	

Note:—Case No. 50 was the first subject experimented upon. The next day the effect of the shutter was discovered. A subsequent test of this man, who was a most careful observer, put him in Class A when shutter was used.

Among the less efficient classes there were three or four observers whose poor showing could not be explained on any of the data recorded. One of these however was suspected at the time of his test of not giving his conscientious cooperation, and two others admitted at the beginning of the test that they were very tired from lack of sleep.

It seems, therefore, from a study of the data in Tables II to VII that there are physical reasons for the marked individual variations in the ability of the binocular parallax to judge distance. Furthermore, that it is possible by means of an apparatus smilar to the one used here to eliminate those candidates whose judgment of distance is below normal and also to classify the normal observers into several groups according to their degree of excellence.

To determine what should be called a "normal" or "not normal" in the judgment of distance is a very difficult proposition. It is decidedly a relative matter especially when an examination affords a classification as this one does. A careful study of the data, however, convinces me that a break occurs between the 20 and 30 mm. depth-differences. Beyond the 20 mm. station there seems to be a physical cause for a poor showing in almost every case. With some it was visual asymmetry or some muscle imbalance. With others there was a persistent tendency to project one image nearer. Or it may be that the subject was wearing a high correction. Another thing is noted, i. e., the great majority of the flyers fell into the first four groups. This latter explanation may seem like an empirical one, so I take this opportunity to state what I should have liked to include in the tables, viz., that I took every opportunity possible to question the flyers upon their training, their accidents if any, and to obtain their opinions as to the importance of certain visual factors. Therefore basing my conclusions upon all the facts at my disposal, both those recorded and those unrecorded, I feel justified in recommending as normal a binocular parallactic angle not greater than 8.0", when the test is made with an apparatus made on the principles of the one used in these experiments.

An important feature of the test is the use of the screen or shutter. Lifting this quickly gives a sudden impression of the rods which is more accurate than is a delayed impression. In fact most of our every day depth judgments are made instantaneously or practically so. During the war, balloon observers in training were required to make instantaneous judgments of distance in spotting shell bursts near targets. Of course in this case linear perspective aided them greatly. An aviator recently told me he was convinced that the success of the great aces was largely due to the fact that they made instant decisions. It would seem then that accurate determination of not only visual but also depth perception reaction times would be of great value.

This last mentioned phase of the subject is made the more complex when we reflect that the flyer must not only judge his distance accurately, but also his speed. More properly therefore the whole subject might with profit be approached from the view point of trying to discover the correlation between judgment of distance and of speed. A priori it would seem that those flyers possessing very quick reaction times as well as small binocular parallactic angle thresholds should be able to give the best performances.

ACCESSORY DATA.

A. Monocular Judgment of Distance.

Our ability to judge distance with only one eye depends upon two things:

1. Terrestrial association.
2. Size of the retinal image, but this only when we recognize the object fixated or its association with some other object we know from experience.

In order to be able either to confirm or to refute the opinion expressed by some that the loss of an eye by an aviator should not necessarily disqualify him from further flying, I examined ten men for the purpose of learning their ability to judge distance monocularly. Nine of these men had already

TABLE V. CLASSIFICATION OF OBSERVERS CONTINUED.
Class D. (Those whose threshold is represented by a depth difference of 20 mm.)

No.	Name.	Age.	Army Service.	Hours Flying.	Vision.	Muscle Balance.	N.P. Accom.	N.P. Conv.	Inter P.D.	Image Projected Nearer	Correct judgments in 20 trials						Binocular Parallactic Angle.	Remarks.
											Depth Differences					Percent Correct at 20 mm.		
											40 mm.	30 mm.	20 mm.	15 mm.	10 mm.			
60.	E. B.	12	School Boy	....	R.20/15 L.20/15—	Eso ½	82	75	58.5	......	20	20	19	13	11	95	6.676"	
61.	H. A. G.	26	Pilot	300	R.20/15 L.20/15	Exo 2 Exo' 9	108	95	59.5	......	20	19	20	13	7	100	6.798"	Excessive exophoria both for near and distance.
62.	N. S. A.	24	Pilot	300	R.20/15 L.20/15	Orth	100	60	60	......	20	20	17	11	8	85	6.850"	
63.	R. K. H.	23	Pilot	....	R.20/15+ L.20/15+	Orth	100	85	60	......	20	19	15	9	9	75	6.850"	
64.	C. P. M.	22	Pilot	175	R.20/15 L.20/15	Orth	95	70	61	......	20	18	15	10	13	75	6.971"	
65.	R. J. H.	24	Pilot	200	R.20/15 L.20/15	Exo 1½ Exo' 10	100	155	62	Left	20	20	18	7	11	90	7.077"	Projects left rod nearer. Has very weak convergence.
66.	N. B. L.	26	Observer	60	R.20/15 L.20/15	Exo ½	127	88	62	Left	20	20	16	12	11	80	7.077"	Projects left rod nearer.
67.	C. B. T.	31	Pilot	150	R.20/20+ L.20/20	Eso ½	102	85	63	......	20	17	15	12	13	75	7.197"	
68.	G. A. Y.	32	Pilot	....	R.20/15 L.20/15	Eso 1	120	75	63	Right	20	17	15	11	12	75	7.197"	Projects right rod nearer.
69.	H. R. C.	26	Pilot	100	R.20/20— L.20/20—	Eso 1	85	90	63.5	......	19	16	16	13	12	80	7.250"	
70.	E. B. M.	22	Pilot	60	R.20/15 L.20/15+	Exo 4 Exo' 12	100	175	64	......	20	18	16	7	8	80	7.306"	Excessive exophoria and very weak convergence.
71.	J. L. J.	30	Pilot	175	R.20/15— L 20/15—	Orth	115	85	65	Left	20	20	18	5	7	90	7.423"	Projects left rod nearer.
72.	W. H. P.	24	Pilot	400	R.20/15— L.20/15	Eso ½	85	90	65	......	20	18	18	13	11	90	7.423"	
73.	G. B. B.	25	Pilot	165	R.20/15— L.20/15—	Eso 1½ R.H. 1	95	[illegible]	65	Left	20	20	16	8	13	80	7.423"	Tendency to project left rod nearer. Has a latent vertical deviation.
74.	H. S. S.	22	Pilot	60	R.20/15 L.20/15	Eso 5	95	92	65	......	20	20	16	6	8	80	7.423"	Excessive exophoria for distance.
75.	M. A. M.	31	Pilot	250	R.20/20— L.20/30	Exo 2	110	80	65	Right	20	20	15	8	11	75	7.423"	Projects right rod nearer. Vision not normal and not symmetrical.
76.	C. M. S.	23	Pilot	80	R.20/15— L.20/15	Orth	115	90	65	Left	20	19	15	8	6	75	7.423"	Projects left rod nearer.
77.	J. J. V.	24	Pilot	200	R.20/15— L.20/15—	Orth	85	80	66.5	......	20	20	15	12	7	75	7.595"	
78.	H. M. H.	24	Pilot	160	R.20/10— L.20/10—	Eso ½	98	50	67	Left	20	18	17	16	13	85	7.650"	Projects left rod nearer.
79.	J. H. V.	29	Balloon Observer	150	R.20/15 L.20/15	Eso ½	110	50	67	......	20	20	16	11	12	80	7.650"	No sleep the previous night. Gave conscientious assistance in test but stated he was too tired to do well.
80.	B. L. W.	56	Med. Corps	....	R.20/15+ L.20/15+	Eso 4	310	75	67	......	20	15	16	10	9	80	7.650"	Wearing hyperopic and presbyopic corrections. Accommodation taken without near correction.
81.	D. C. M.	25	Pilot	....	R.20/15 L.20/15	Eso 1	75	50	67	......	20	19	15	14	10	75	7.650"	
82.	R. E.	24	Pilot	125	R.20/15 L.20/15—	Eso 3 Eso' 10	65	60	71	......	15	16	16	14	8	80	8.105"	Has had marked asthenopic symptoms recently. Examination showed mixed astigmatism.
	Average	26.3			O.U.20/15—	Eso ⅛	108	83	64	......	..	..	..	..	..	81.5	7.308"	

Note.—Phoria for near has only been recorded when abnormal Near findings are designated by the prime sign, e. g., Exo' 12.

TABLE VI. CLASSIFICATION OF OBSERVERS CONTINUED.

Class E. (Those whose threshold is represented by a depth difference of 30 mm.)

No.	Name.	Age.	Army Service.	Hours Flying.	Vision.	Muscle Balance.	N.P. Accom.	N.P. Conv.	Inter P.D.	Image Projected Nearer.	Correct judgments in 20 trials — Depth Differences — 50 mm.	40 mm.	30 mm.	20 mm.	15 mm.	Percent Correct at 30 mm.	Binocular Parallactic Angle.	Remarks.
83.	W. W. M.	26	Pilot	....	R.20/20— L.20/15	Orth	84	65	62	Right	16	15	15	10	..	75	10.604"	Projects right rod nearer. Very erratic, easily fatigued. Loss of sleep several nights.
84.	C. T.	26	Pilot	170	R.20/15+ L.20/15+	Orth	120	65	62.5	Left	20	18	15	6	..	75	10.686"	Strong tendency to project left rod nearer.
85.	C. P. H.	31	Pilot	....	R.20/15— L.20/15—	Exo 5 L.H. ½	190	90	63	......	..	20	19	13	11	95	10.774"	Has muscle imbalance.
86.	E. W. D.	41	Med. Corps	....	R.20/15 L.20/15	Eso 2	105	80	64	......	..	20	16	11	12	80	10.940"	Wearing high hyperopic correction.
87.	J. H.	28	Med. Corps	....	R.20/15 L.20/15	Exo 1	135	67	64.5	......	..	20	17	11	8	85	11.029"	Wearing high hyperopic correction.
88.	E. C.	47	San. Corps	....	R.20/20— L.20/20+	Exo 1 L.H.1	R170 L160	90	64.5	......	18	19	16	12	8	80	11.029"	Wearing myopic correction. Has latent vertical deviation.
89.	P. D.	43	Med. Corps	....	R.20/10 L.20/10	Exo 2	185	55	65.5	......	..	20	16	12	10	80	11.204"	Wearing astigmatic correction.
90.	J. D. G.	37			R.20/15— L.20/15—	Exo 2 R.H.½	155	115	67	......	..	20	18	13	13	90	11.459"	Has weak convergence.
91.	J. D. B.	29	Med. Corps	....	R.20/10— L.20/10—	Orth	110	90	67	Right	..	20	16	7	..	80	11.459"	Projects right image nearer. Wearing high correction for hyperopic astigmatism.
92.	J. R. C.	21	Pilot	100	R 20/20+ L.20/20—	Eso 1	90	80	69	Left	..	20	17	12	7	85	11.802"	Strong tendency to project left rod nearer.
	Average	32.9			R.20/15— L.20/15	Exo 4/5	134	80	65	......	..	..	..	..	..	82.5	11.099"	

Class F. (Those whose threshold is represented by a depth difference of 40 mm.)

No.	Name.	Age.	Army Service.	Hours Flying.	Vision.	Muscle Balance.	N.P. Accom.	N.P. Conv.	Inter P.D.	Image Projected Nearer.	50 mm.	40 mm.	30 mm.	20 mm.	15 mm.	Percent Correct at 40 mm.	Binocular Parallactic Angle.	Remarks.
93.	C. J. R.	52	San. Corps	....	R.20/40+ L 20/30	Exo 1	190	100	65	......	20	18	12	14	11	90	14.800"	Wearing correction but vision not normal and not symmetric.
94.	G. C. P.	30	Pilot	300	R 20/30— L.20/30—	Exo ½	75	100	66	......	20	16	13	11	..	80	15.021"	Vision not normal but equal in the two eyes. Had no serious landing trouble.
95.	L. E. B.	30	Balloon Observer	100	R.20/30 L.20/15	Exo 1½	R165 L192	100	69	Left	20	17	10	..	..	85	15.705"	Projects L. rod nearer. Considerable uncorrected hyperopia. Vision better in left eye.
	Average	37			R.20/30— L.20/20—	Exo 1	147	100	67	......	..	..	..	..	..	85	15.175"	

TABLE VII. CLASSIFICATION OF OBSERVERS CONTINUED.

No.	Name.	Age.	Army Service.	Hours Flying.	Vision.	Muscle Balance.	N.P. Accom.	N.P. Conv.	Inter P.D.	Image Projected Nearer.	Correct Judgments in 20 trials — Depth Differences					Percent Correct	Binocular Parallactic Angle.	Remarks.
					Class H. (Those whose threshold is represented by a depth difference of 60 mm.)													
											90 mm.	60 mm.	50 mm.	40 mm.	30 mm.	Percent Correct at 60 mm.		
96.	H. F. H.	24	Pilot	300	R.20/30— L.20/20—	Eso ½	95	110	62	......	..	20	13	16	8	100	21.103"	Slightly myopic. Vision not symmetric. Has weak convergence.
97.	E. W. D.	41	Med. Corps	....	R.20/30 L.20/30	Eso 2	105	80	64	......	..	20	11	..	..	100	21.780"	Same case as No. 86, but with vision uncorrected.
98.	P. W. C.	45	Med. Corps	....	R.20/50 L.20/50+	Exo ½ L.H. ½	325	100	64.5	......	20	16	11	..	..	80	21.949"	Same case as No. 31, but with vision uncorrected.
99.	J. M. W.	39	Med. Corps	....	R.20/50 L.20/50	Exo 3	140	60	67	......	..	20	..	..	..	100	22.805"	Same case as No. 41, but with vision uncorrected.
	Average	37.3			R.20/40 L.20/40+	Exo ¼	166	88	64.4	......	..	..	..	..	..	95	21.909"	
					Class I. (Those whose threshold is represented by a depth difference of 90 mm.)													
											150 mm.	120 mm.	90 mm.	60 mm.	50 mm.	Percent Correct at 90 mm.		
100.	P. F. O.	28	Pilot	150	R.20/30+ L.20/30+	Eso ½	100	50	62	Left	20	19	16	14	8	80	31.498"	Very strong tendency to project left rod nearer. Vision not normal but equal.
	Average	Same as above.																
					Class J. (Those whose threshold is represented by a depth difference of 120 mm.)													
																Percent Correct at 120 mm.		
101.	V. T. S.	30	Med. Corps	....	R.20/70 L.20/200	Eso 1	145	160	69	......	20	17	14	10	8	85	46.502"	Highly myopic; not corrected.
	Average	Same as above.																
					Class K. (Those whose threshold is represented by a depth difference of 180 mm.)													
											180 mm.	150 mm.	120 mm.	90 mm.	60 mm.	Percent Correct at 180 mm.		
102.	J. M. W.	39	Med. Corps.	....	R20/200 L.20/200	Exo 3	140	60	67	......	18	..	..	..	..	90	67.077"	Same case as Nos. 31 and 98. Left eye alone corrected to make vision symmetric.
.03.	A. B. H.	26	Pilot	120	R.20/15— L.20/15—	Eso 3	102	70	71	Left	20	14	12	10	13	100	71.082"	Strong tendency to project L rod nearer. Single binocular vision for near, but intermittent for distance.
	Average	32.5			O.U.20/50—	Orth	121	65	69	......	..	..	..	..	..	95	69.079"	
					Class L. (Those whose threshold is represented by a depth difference of 270 mm.)													
											300 mm.	270 mm.	240 mm.	210 mm.	180 mm.	Percent Correct at 270 mm.		
104.	W. T. G.	39	A. S. Non-Flier	....	R.20/50+ L.20/15	Eso 4	R250 L185	80	64	Right	20	18	12	16	8	90	94.730"	Small central relative scotoma R. E. Strong tendency to project right rod nearer. Vision not symmetric.
	Average	Same as above.																
					Class M. (Those whose threshold is represented by a depth difference of 360 mm.)													
											360 mm.	240 mm.	180 mm.			Percent Correct at 360 mm.		
105.	J. M. W.	39	Med Corps	....	R.20/200 L.15/200	Exo 3	140	60	67	......	16	..	..	..	..	80	130.359"	Same case as Nos. 31, 98 and 102, but with vision wholly uncorrected.
106.	S. E. G.	55	Med. Corps	....	R.20/200 L.20/100	......	..	..	70	......	16	12	10	..	..	80	136.200"	Myopic test made without correction.
	Average	42			R.20/200 L.20/200—	......	..	..	68.5	......	..	..	..	..	..	80	133.280"	

been examined by the binocular test. The tenth man was an aviator who had lost one eye thru an accident. The result of these tests are recorded in Table X. The same apparatus was used for both the binocular and monocular tests, so the results are comparable. In the former test it was accepted tentatively at least, that not more than two factors, the binocular parallax and the retinal image, operated in the depth-difference determinations, whereas in the monocular test the difference in size of the retinal images or visual angles of the two rods was the only determining factor. From the data of Table X, it is noted that the average depth-difference representing the first recognition of an inequality of the two rods was 250 mm. According to computation derived from Table VIII, this distance represents a difference in visual angle of 0.23′ or 13.8″. The average monocular threshold depth difference, however, is somewhat larger. From the same table we find it to be at least 285 mm. which represents a visual angle difference threshold of 0.26′ or 15.5″. By referring to the records showing the binocular ability of the nine men we find that their average binocular threshold was represented by a depth-difference of only 14.4 mm., or by a binocular parallactic angle of 5.3″. This is about one-third the size of the visual angle required for the monocular test. If however, we compare the depth-difference thresholds we find that the binocular ability is twenty times that of the monocular. In other words, according to this conventional test, the binocular parallactic ability is twenty times more valuable as a determining factor in the judgment of distance than the best discrimination recognizable by the retinal image.

From the results obtained by the binocular and monocular tests it is evident that the apparatus altho devised to eliminate all factors except the binocular parallax and the visual angle, actually eliminates everything except the binocular parallax when the test is made with both eyes.

Another important distinction was revealed by the test, and that is, judgment with monocular observation is very slow. One must carefully study the object and surrounding data while binocular judgment is practically instantaneous.

Monocular vision is also very liable to a "reversal" deception, e. g., a valley may appear in perspective as a hill or vice versa. In case of a wrong interpretation by a one-eyed aviator trying to land, his disillusionment might easily come too late. On the other hand binocular single vision may be deceived only when the depth-difference is less than that which subtends the individual's least binocular parallactic angle. What would at first thought appear to be an exception in the case of binocular vision, and which

TABLE VIII. VARIATIONS IN THE VISUAL ANGLE SUBTENDED BY A 10 mm. ROD AT DIFFERENT DISTANCES.

Distance in mm.	Angle in minutes
6000.	5.730
6005.	5.725
6010.	5.720
6015.	5.715
6020.	5.710
6030.	5.701
6040.	5.691
6050.	5.682
6060.	5.673
6090.	5.645
6120.	5.617
6150.	5.590
6180.	5.563
6210.	5.536
6240.	5.509
6250.	5.500
6270.	5.483
6285.	5.470
6300.	5.457
6330.	5.431
6360.	5.405

TABLE IX. SIZE OF OBJECT REQUIRED TO MAINTAIN A VISUAL ANGLE OF 5.73 MINUTES AT THE FOLLOWING DISTANCES:

Distance in mm.	Size of object in mm.
6000.	10.000
6005.	10.008
6010.	10.017
6015.	10.025
6020.	10.033
6030.	10.050
6040.	10.067
6050.	10.083
6060.	10.100
6090.	10.150
6120.	10.200
6150.	10.250
6180.	10.300
6210.	10.350
6240.	10.400
6250.	10.417
6270.	10.450
6285	10.475
6300.	10.500
6330.	10.550
6360.	10.600

renders it almost as helpless as monocular, occurs when the distance to an absolutely flat surface with no associated objects within the visual field is to be judged, like the distance from an aeroplane to the surface of a perfectly calm sea. In this instance, however, the problem is reduced purely to the judgment of absolute distance with no relative distance criteria to assist. In other words there is no depth-difference to be judged when there is apparently only one distance.

B. Judgment of relative and absolute distance.

Some one may offer the criticism that with this apparatus the applicant is asked to perform a test for judgment of relative distance when the aviator's chief problem is absolute distance. The answer to this is that correct judgment of the latter depends upon the summation of a series or succession of judgments for relative distance, i. e., our eyes instinctively and unconsciously travel back and forth from one associated object to another over the interval to be judged, perhaps not only once but several times before our judgment of absolute difference is made. The best example to prove this is the great error made by untrained observers in judging distance on the water.

C. Night Landings.

A difficulty similar to landing upon a calm sea arises in making night landings. There is a lack in the necessary visual- and depth-difference contrasts. The Navy Department recognized this difficulty and several months ago devised an instrument to overcome it. According to a statement in Aerial Age Weekly of February 24, 1919, "The naval night altitude indicator consists of four spot lights whose rays are projected downward from the fuselage at such an angle that when the altitude of fifty feet is reached the two right and two left beams meet, forming a single spot on the ground. As the plane drops to a still lower altitude the beams again diverge, thus indicating the approximate distance from the ground. With a little practice the aviator is enabled to make very accurate landings with the assistance of this device."

D. The Projection of Objects Horizontally superimposed.

A test was made on several men to

TABLE X. MONOCULAR JUDGMENT OF DISTANCE USING SIX METER STEREOSCOPE.

(Judgment was made by the difference in size of the retinal images of the two rods.)

No.	Name.	Age.	Vision.	Correct judgments at the following depth differences: 180 mm.	210 mm.	240 mm.	270 mm.	300 mm.	First noted one rod larger when depth difference was	Monocular Threshold	Represents visual angle difference of	Binocular Threshold	Represents binocular parallactic angle of
1.	J. N. B.	44	R.20/15	....	50%	90%	100%	.....	210 mm.	240 mm.	13.2"	10 mm.	3.4"
2.	H. M. J.	34	R.20/15	40%	60%	70%	90%	.....	240 mm.	240 mm.	13.2"	5 mm.	1.9"
3.	P. D.	43	R.20/10	55%	35%	65%	70%	95%	210 mm.	270 mm.	14.7"	30 mm.	11.2"
4.	C. K.	23	R.20/15	40%	....	50%	....	100%	240 mm.	300 mm.	16.4"	15 mm.	5.6"
5.	E. C. C.	47	L.20/20	40%	50%	60%	....	100%	240 mm.	300 mm.	16.4"	30 mm.	11.0"
6.	E. W. H.	33	R.20/15	60%	60%	30%	....	90%	210 mm.	300 mm.	16.4"	10 mm.	3.8"
7.	E. B. G.	38	R.20/15	....	....	60%	....	70%	300 mm.	300 mm.	16.4"	15 mm.	5.3"
8.	P. W. C.	46	R.20/15	40%	50%	39%	35%	40%	270 mm.	Over 300 mm.	Over 16.4"	10 mm.	3.7"
9.	C. A. R.	41	R.20/15	....	30%	....	50%	60%	270 mm.	Over 300 mm.	Over 16.4"	5 mm.	1.8"
10.	M. B. C.	20	L.20/20	50%	....	45%	....	65%	300 mm.	Over 300 mm	Over 16.4"	R. Eye Blind.....	
	Average	37	20/15	48%	48%	58%	69%	77.5%	250 mm.	Over 285 mm.	Over 15.5"	14.4 mm.	5.3"

determine their ability to judge which of the two rods was nearer when the apparatus was turned over on its side, thereby putting the rods in a horizontal position. In doing this the advantage of the binocular parallax was entirely lost and, as was to be expected, the judgment of the relative position of the horizontal rods was no better with two eyes than with one, and was reduced solely to the one factor, viz., the size of the retinal images. A recent aeroplane accident serves as a practical illustration of this inability to judge horizontal objects especially when they are suspended in the air with no linear parallax and other terrestrial association factors to help. During the Fifth Liberty Loan campaign an aviator was flying a captured Fokker as a member of the U. S. flying circus. He attempted to make a landing in a field in Cincinnati. His approach was at right angles to and over two sets of telegraph and telephone wires. He flew close to the ground intending to zoom over the wires and then drop down into the field. What actually happened was that he tore down both sets of wires, broke down a large pole and crashed. If the flyer had realized the difficulty of accurately projecting or judging the distance of horizontal wires with only the sky as a background, he probably would not have attempted the feat.

CONCLUSIONS.

1. Of all the personal factors which aid us in the judgment of distance, the binocular parallax is the most important. By experiment it was found to possess twenty times the ability of the retinal image or visual angle which is the important factor in monocular judgment. This however should not represent the comparative depth judgment skill of two and one-eyed persons, because in actual life the extraneous factors by helping both equally, serve greatly to lessen the difference in ability of the respective personal factors.

2. The minimal binocular parallactic angle varies greatly with individuals. It depends upon such factors as visual acuity, equality of visual acuity or visual balance, muscle balance, interpupillary distance, and probably some innate and acquired ability.

3. Fourteen observers (twelve of whom were pilots) out of one hundred and six examined were found to possess judgment of distance to a remarkable degree. Their binocular parallactic angles ranged from 1.8″ to 2.0″ with an average of 1.89″.

4. To possess normal judgment of distance one's binocular parallactic angle should not be greater than 8.0″ when the test is performed with an apparatus made on the principles of the one used for these experiments. This includes classes A, B, C and D of this experiment (See Tables II to V).

5. An apparatus like the one used in this experiment is free from the criticism of the hand stereoscope. Furthermore, it permits of classification of individuals according to their discriminating ability. In view of the different requirements in various forms of military aviation it would be an advantage to be able to assign successful applicants to special training according to their different degrees of ability.

6. The value of such an apparatus is greatly enhanced and much smaller discriminations are possible by giving the observer a sudden impression of the objects to be judged. Otherwise there is apt to be a disconcerting fluctuation of those objects. Most of our natural binocular judgments are more or less instantaneous. Therefore the shutter on the apparatus is an important requirement.

7. The binocular parallax operates in the judgment of objects maintaining some horizontal or lateral separation, but not for superimposed objects like telegraph wires. In the latter instance judgment is dependent upon the interpretation of the retinal images when all factors extraneous to the individual like terrestrial association and aerial perspective are excluded.

8. To estimate correctly the position of an object one must know its

direction and distance. Direction is judged more accurately with one eye but distance better with both. To be denied the privilege of using either one or two eyes at will would be a distinct disadvantage to an aviator.

9. The reaction time required to make monocular judgments of distances is very slow, whereas binocular judgments are practically instantaneous.

10. A tendency to project one image nearer than the other was found in 23 out of the 106 subjects. Some showed this tendency to a marked degree. Altho some of these cases had muscle imbalance, others visual asymmetry, and still others had both these abnormal conditions, the phenomenon cannot be explained satisfactorily.

11. The wide variations in the visual angle and binocular parallactic angle thresholds according to the experiments herein recorded make it evident that the two angles have nothing to do with each other. It is a mistake therefore to assume because the cones in one's retina are limited to a certain distance apart, that one's binocular parallactic angle must necessarily be limited to the size of the visual angle representing that distance.

12. The effect of low oxygen on the depth perceiving sense is of little importance because, at the critical time during the flight, which is the landing, there is no lack of oxygen.

RELATION OF THE OCULAR MUSCLES AND SCLERA IN THE ETIOLOGY OF MYOPIA.

S. Ochi, M. D.

KYUSHU, JAPAN.

This paper discusses probable factors in the etiology of myopia, and reports experiments bearing on the influence of compression upon the development of the eyeball.

There are many hypotheses concerning the genesis of myopia, which I will not repeat here. I wish only to call attention to the relation of the ocular muscles and sclera to myopia as indicated by my experiments.

I. Ocular Muscles and Sclera. All vertebrates (except myxinoids) have four recti muscles and two obliques, inserted on the eyeball. Some vertebrates have in addition a retractor bulbi, which is found in most forms from the amphibia upwards, but does not exist in man and monkeys.

The ocular muscles have the movement of the eyeball as their principal function; but that they may serve other purposes also is indicated by the fact that the ocular muscles of some animals are excessively developed in comparison with the size of their eyeballs. For example, the ocular muscles of the whale are of enormous size. Therefore Weber[1] suggested that such excessively developed muscles might serve as an elastic cover to protect the eye. But Pütter[2] said that the strongly developed ocular muscles may serve to keep the eye warm. Tho the physiologic function of the ocular muscles may not always be so simple, it can be easily understood that the eyeball-wall can undergo some pressure by the contraction of the ocular muscles; and if the muscles are strongly developed, the compression of the eyeball must be greater.

The sclera of vertebrates is composed of fibrous tissue, cartilage and bone. But that of mammals contains no cartilage or bone, except in the monotremes, which retain cartilage in the sclerotic coat. The thickness of the sclerotic coat varies with the species, and moreover its thickness varies in different parts of the same eyeball being thick in some parts, while thin in others. We know that the eye of the whale has a very thick sclerotic coat. Weber[1] explained this fact as due to the resistance of the sclera against hydrostatic pressure. But the sclerotic coat of the whale is especially thick in the back of the eyeball. If its resistance against the hydrostatic pressure is the only reason for the thickness of the sclera, then the wall of the eyeball should be as thick in front as behind. I believe that this phenomenon is probably due to the resistance against the pressure of the strongly developed ocular muscles. Also in the human eyeball the sclerotic coat of its rear pole is the thicker, altho it is not so excessively thick as the whale. I should give in this case, too, the same explanation as for the whale.

I understand that the sclera of the eye of any animal is usually so constructed as to resist the pressure of the ocular muscles.

I once studied anatomically many Japanese eyeballs, and have found that the longest diameter of the adult eyeball runs from its inner-upper part to the outer-lower.[8] But I could not find the same condition in the eyes of the newborn and babies under one year, with few exceptions. I concluded, a posteriori, that the diameter, which runs from the inner-upper part to the outer-lower, is the longest of all the diameters of the eyeball. And I explained this condition as due to the relation of the insertions of the muscles on the eyeball and the pressure produced by their contraction.

I have conducted experiments in rabbits to determine the relation between the pressure of the ocular muscles and their influence upon the diameters of the eyeball. Ascher brought some young rabbits to the condition of forced convergence by advancing the attachments of their internal and inferior recti. After about five months he found no change of the form and the diameter of the eyeball. I have repeated the same experiment and found no influence upon the length of the diameters of the eyeballs.

Therefore I decided to make a stronger pressure upon the eyeball. For this purpose I used a foreign body, which I tried to wedge between the ocular muscles and eyeball. As a foreign body I have used an absorbent cotton-ball, which is tied fast by silk thread. It is almost as big as a kernel of rice and is disinfected by boiling. The operation, which is to put the cotton-ball between the muscles and eyeball, was only successful on the upper side, that is, between the superior rectus and the eyeball. On the other three sides I had no success, because the ocular muscles were easily broken during the manipulation. On these three sides I was obliged to leave the cotton-ball over the exposed muscles, putting the foreign body in between the margin of the orbit and the corresponding muscle. In this way the eyeball may be constantly compressed by such a foreign body. At the beginning of these experiments I used to expose the ocular muscles by cutting the bulbar conjunctiva. But this operation often results in inflammation of the corner, so I improved it at last by incising the eyelid without hurting the bulbar conjunctiva for the purpose of exposing the muscles.

In these experiments 41 young rabbits (22-30 days old) were used, and in one eye of each rabbit a foreign body was inserted, while the other eye served as the control. Six months after the operation nine rabbits were alive, in three of which the foreign body was inserted on the upper side, and on the other three sides in two rabbits each. In these nine cases the three on the upper side (No. I, II and III of the next table) and the one on the lower side (No. IV) showed the following results, while the others showed no change of the diameters of the eyeballs:

	Vertical Diameter (in Mm.)		Transverse Diameter (in Mm.)		Antero-posterior Diameter (in Mm.)	
No.	Normal Eye	Operated Eye	Normal Eye	Operated Eye	Normal Eye	Operated Eye
I	17.35	15.8	18.4	18.8	16.3	16.5
II	17.7	17.5	19.2	19.4	17.1	17.2
III	16.6	16.0	17.3	17.4	16.0	16.0
IV	17.6	17.4	18.9	18.9	16.8	16.8

In experiment No. I, I have found that the part of the eyeball-wall, where the foreign body was wedged in, was a bit flattened therefore the vertical diameter of the operated eye was 1.55 mm. shorter than that of the normal side, and the transverse diameter of the former 0.4 mm. longer than that of the latter, and the antero-posterior diameter of the former is 0.2 mm. longer than that of the latter. But the other cases showed only slight differences between the operated and normal eye or remained unchanged.

I decided to let the antero-posterior diameter undergo the influence of a stronger compression. So I bound the equator of the eyeball of young rabbits by silk thread, instead of wedging in a foreign body. For this operation a greatly curved needle was stuck thro the eyelid near the anterior or posterior canthus without hurting the eyeball or the bulbar conjunctiva, and running around the equator of the eyeball the thread was brought out again at the puncture and there tied. For this experiment six rabbits (25 days old) were used, of which three were living after six months. I enucleated both eyes of these rabbits, and found the silk thread tied around the operated eye already broken. The results of the measurements are as follows:

	Vertical Diameter (in Mm.)		Transverse Diameter (in Mm.)		Antero-posterior Diameter (in Mm.)	
No.	Normal Eye	Operated Eye	Normal Eye	Operated Eye	Normal Eye	Operated Eye
I	17.15	17.0	18.6	19.0	16.8	17.4
II	17.1	17.0	18.35	18.5	16.7	16.9
III	17.2	17.2	18.6	18.7	16.7	17.0

According to these experiments we can understand, that strong compression caused the antero-posterior diameter to lengthen, and these cases showed myopia (No. I myopia of 10 D, No. II and III that of 7 D) before their enucleation. But they all had nubecula near the margin of cornea, therefore these degrees of myopia cannot exactly correspond to the length of the antero-posterior diameter, and there was found no developing of conus at the fundus.

As a result of the experiments with rabbits, mentioned above, we conclude that, even a pretty strong compression, continuous upon the eyeball, cannot greatly lenghten its diameter. Therefore it seems likely that the pressure of the ocular muscles alone upon the wall of the globe cannot greatly change the antero-posterior diameter, if the wall is normally strong. But, if the resistance of the sclera is weaker than normal, even the compression of the ocular muscles alone could lengthen the antero-posterior diameter. I would ascribe the developing of juvenile progressive myopia to the pressure of the ocular muscles upon eyeballs with weak sclerotic coats.

II. The sclera is to be regarded as a part of the cranium. Most vertebrates below the Mammals have a cartilaginous layer in the sclera, and many Selachii have a cartilaginous ocular support, which pushes into the orbit from the wall of the skull and supports the eyeball behind. Gegenbaur[4] rightly interpreted the existence of a cartilaginous ocular support as an indication that the sclerotic cartilage is derived from the skull. The form of the ocular support is not always the same; in some it is absent altogether, in others it is imperfectly developed, a rudimentary ocular support as suggested by Franz[5]. In any case the existence of the ocular support evidently proves the closest relation between primordial cranium s. chondrocranium and sclerotic cartilage.

I have pointed out that, at the beginning of the development of the sclerotic cartilage in the chick embryo, the cartilage first appears in the sclera at a point, which corresponds to the part where in the Selachii the ocular support touches the eyeballs. Therefore I regarded the sclerotic cartilage of the embryo as a part of the primordial cranium, and so consequently the sclera in the adult animal as developmentally a part of the cranium.

My opinion is not unreasonable from the embryologic point of view, for at the beginning of its development the eye starts as the primary optic vesicle at either side of the primary fore-brain. Therefore the sclera developing around the primary optic vesicle may correspond to the cranium, which develops around the brain.

But the eye has its orbit. It may be thought that what corresponds to the cranium for the brain, is the orbit for the eye. But I have found such a correspondence unreasonable by my study of the orbit[6]. If we make a comparative study of the several bones in the so-called orbital wall of Amniota, we can assure ourselves these bones belong to the organs surounding the eye, or connect the surrounding organs with each other, and there is no bone, which must belong specially to the organ of vision. Therefore it is not correct from the standpoint of comparative anatomy to compare the relation of the orbit to the eyeball to that of the cranium to the brain. Altho the structure of the sclera is not always the same in the different kinds of animals, I can make the following suggestion.

The sclera of the eye corresponds to the cranium of the brain; consequently the sclera may be compared to the skeleton of the human body.

III. Development of myopia and its prophylaxis.

In the preceding paragraphs I have related some experiments concerning the relation between the compression of the ocular muscles and the resistance of the sclera against it, and from these I have concluded that the development of progressive myopia is due chiefly to more weakness of the sclera than normal. Therefore according to my thought the weak sclera causes a predisposition to myopia. Because of the correspondence of the sclera to the skeleton, some scrofulous, weak children may have a predisposition to progressive myopia.

Formerly tenotomy of the external rectus was tried as a treatment and prophylaxis of myopia. But there was no good effect.

I think that is because altho by the tenotomy the pressure by the ocular muscles on the eyeball may be temporarily a little reduced, unless the resistance of the sclera against the compression can be increased, such a treatment cannot assure a permanent cure for myopia.

Owing to my opinion as stated above I would at first suggest an improvement of the constitution as the prophylaxis for progressive myopia. Hence for children with weak constitutions an attempt must be made to strengthen the skeleton and with it the sclera. For this purpose I suggest, for scrofulous children especially, some proper sports.

According to my study[8], the size of the eyeball of children reaches by 8-9 years that of the adult. But of course the skeleton of children at that age is not so big and strong as that of an adult; and so the sclera in childhood may not be so strong as that of an adult. Usually progressive myopia develops in children of primary school age. Therefore in children, whether they have a predisposition to myopia or not, unhygienic exhaustion of the eye must be garded against, because unhygienic use of the eye can give an excessive compression of ocular muscles upon the wall of the globe, which is not yet strong enough to withstand it. This gives an opportunity to break the balance between the pressure of the muscles upon the eyeball and the resistance of the sclera against it. That is to say, this may provoke the development of myopia. I mean by "predisposition to myopia" in the above " ones with weak constitution, heredity of myopia and so forth."

By way of summary we may say that proper exercise for children with myopic predisposition forms the active prophylaxis for progressive myopia; and as a measure of general prophylaxis all children should be guarded against exhaustion of the eye.

REFERENCES.

1. Weber, M. Die Säuger. 1904, p. 564.
2. Pütter, A. Graefe-Saemisch Handbuch, v. 3. Organologie des Auges, 1912, p. 386.
3. Ochi, S. Nippon Gank. Zasshi, v. 21, No. 3; v. 22, No. 1.
4. Gegenbaur. Vergleichende Anatomie der Wirbelthiere, 1895.
5. Franz, V. Lehrbuch d. vergl. microsk. Anatomie. Sehorgan, 1913, p. 291.
6. Ochi, S. Vergleichende Anatomie der Amniotenorbita. Mitteilungen aus d. med. Fakultät d. Universität Kyushu, v. 4, 1917.

TUBERCLE OF THE CONJUNCTIVA.

JAMES ALLEN PATTERSON, M. D.

COLORADO SPRINGS, COLORADO.

This is the report of a case which was exhibited at the February, 1919, meeting of the Colorado Ophthalmological Society (see p. 343), with a note on subsequent progress.

I beg to show this case of Tubercle of the Conjunctiva, offer some remarks upon its diagnosis and treatment and exhibit photographs of the condition taken three weeks after the operation, which will be mentioned. A much milder case with tinted illustration was presented to this Society in 1916[1].

This boy, age 13, was first seen on Sept. 21, 1918, his parents giving a history of enlarged parotid gland for some weeks, which was suspected to be mumps when first observed.

The conjunctival trouble had been present all summer and had been treated by the family physician, who used argyrol. Inspection showed the upper lid of the right eye to be thickened and sufficiently heavy to give the appearance of ptosis. Further observation disclosed a large tumor mass high up under the lid which prevented the lid being everted unless great force was used. The bulbar conjunctiva was white excepting for two small reddish elevations near the caruncle, extending toward the limbus, which were accompanied by vessels springing from the caruncle. There was a third small one in the lower cul de sac below the others, otherwise the lower lid was free from invasion.

There was great enlargement of the upper part of the parotid gland, also of another gland which is located just below and over the malar process.

The nose was normal but the tonsils and adenoids were enlarged. The patient did not appear ill, the color of his skin was good, altho his appetite was poor, and his body weight below normal. He had been brought to this climate for the relief of asthma, which has subsided.

Owing to the condition of the tonsils, the enlarged glands, and the fact that the lid could not be everted without sufficient force to cause considerable pain, it was decided to remove the tonsils and adenoids; and while the patient was under the anesthetic, to turn the lid for exploration and treatment. This was done on Sept. 25, when there was found under this eyelid large masses of granulation-like tissue, a majority of the granules being surmounted by a small yellow spot, quite suggestive of tubercle. Slightly to the nasal side of the center of the everted lid there was a deep ulcer, fully 3 mm. in width, extending to the cartilage. The exposed surface was thoroly scrubbed with gauze. It was then found that there remained very tough ridges of a lineal ulcer extending horizontally over the entire everted lid; the ulcer first mentioned being as it were, the bottom of the crater. These hard edges were trimmed smooth with scissors, cauterized with nitrat of silver, it being the only available caustic at the hospital.

The tonsils and adenoids were then removed, a large mass of cheesy material being evacuated from the supratonsillar fossa of the left side.

The next day the patient returned home, it being notice that the glandular enlargements had already lessened in size and were softer. The eye showed almost no reaction.

Diagnosis. The tentative diagnosis of tubercle was made from the glandular involvements and the appearances.

As the photographs show there were on all sides of the ulcer the typical papules, surmounted by small tubercles. The appearances were not in any way suggestive of trachoma, and the ulcer still further disproved it. Furthermore there was not the horny nor flattened pavement-like appearances, nor were there any symptoms that would suggest any likelihood of the affection being vernal conjunctivitis. Parinaud's conjunctivitis was thought of, and the microscopic illustrations of Verhoeff's observations (A. J. O. Oct. 1918) were compared, but the pathologist excluded the possibility of such diagnosis. (Figs. 1 and 2.)

Smears taken showed the presence of tubercle bacilli. The excised specimens were given to Dr. Ryder, of the laboratory of Drs. Webb and Gilbert, who reported that the sections showed areas of caseation with tubercle bacilli in the surrounding margins. These bacilli as well as those found in the smears were acid fast. Dr. Ryder found no cartilage in the sections.

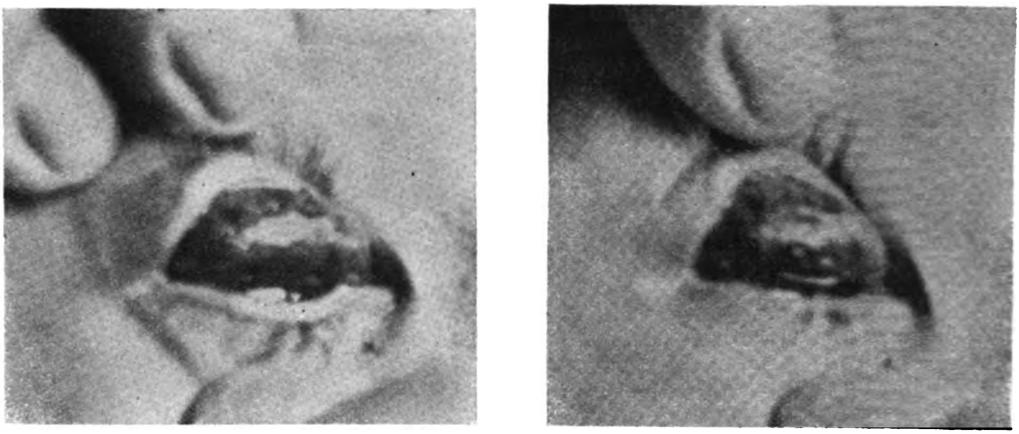


Fig. 1. Fig. 2
Tuberculosis of the Conjunctiva (Patterson).

Treatment—I have noted on Oct. 17, that the eye has been treated twice weekly, that there has been some improvement, particularly of the small elevations on the palpebral conjunctiva. Up to Nov. 9 the improvement was very slow, and after trying glycerit of tannin, saturated solution of trichloracetic acid and formaldehyd in varying dilutions up to full strength, I began giving 1/10,000 mg. of O. T. once a week, which dose was not increased until three weeks ago; it has now reached 1/5,000 mg.

After the first two injections there was a very small local reaction, which disappeared inside of twenty-four hours.

The tuberculin has had more action upon the glands than upon the invasion of the lid. After every dose of the T. O. there has been some lessening in size of the glandular swelling and coincidently he has had at times threatenings of asthma, just a slight, barely noticeable wheeze. The lid has, however, seemingly been improved more by the trichloracetic acid used to cauterize thoroly than by any of the other methods tried. This has been done once weekly.

The invasion near the caruncle mentioned, disappeared within three weeks but there has been some characteristic extension upon the lower lid involving the outer half. This extension has been modified and its spread controlled by the same treatment.

April 23, 1919. The patient has not had tuberculin since Feb. 15. He was taken from school for three weeks, kept out-of-doors, and not allowed to become fatigued. This regimen with a local treatment once a week, has produced marked improvement. The invasion mentioned upon the lower lid has disappeared; the upper lid, although pale from scar tissue, is smooth. The eye is white, free from iritation and conjunctival discharge.

REFERENCE

1. Patterson, J. A. Tubercle of the Conjunctiva. Annals of Ophthalmology, v. 26, p. 76.

NOTES, CASES AND INSTRUMENTS

SUBCONJUNCTIVAL GRAFT OF FASCIA LATA.

JOEL WHITAKER., M. D.

INDIANAPOLIS, IND.

I wish to report a subconjunctival graft, which I used recently with success.

The boy was injured by a splinter of kindling wood piercing his right eye. The wound was at "9 o'clock" on the corneoscleral margin, and just in front of the ciliary body, and extended over three millimeters into the cornea. The iris was torn by the splinter, but fortunately the lens and the ciliary body were uninjured.

The wound occurred in the summer of 1918, and the eye was first treated at a dispensary in Louisville. I saw the boy about July at the Indianapolis City Dispensary; there was then a protrusion of the iris thru the unhealed wound. I did an iridectomy and covered the opening with a single conjunctival patch, after Kuhnt's method. This conjunctival patch was not strong enough to hold, and "ballooned" over the opening with a little more iris protruding.

I again did an iridectomy and used a double conjunctival patch with the same unfortunate result.

On December 10, 1918, there was no plus tension with a McLean tonometer, and the vision was 20/100, so I knew a stronger patch was necessary. While talking to Dr. Murray Hadley, a surgeon of Indianapolis, he suggested fascia lata, and it was this which I used.

I cut away the conjunctiva over the wound and undermined it well back. At the corneal edge of the wound I split the cornea which was much easier to do on account of the conjunctiva which had become attached from the former patch. The opening into the eye was then entirely exposed, irregular in shape, and about 4x3 mm. in size. I took a piece of fascia lata about 1 cm. square, trimmed off the edge to dovetail into the split cornea. I placed this patch under the conjunctiva and put the beveled edge into position where I anchored it snugly with a single stitch, passing thru the fascia lata and outer portion of the cornea. I then passed a silk suture thru each of the other edges of the fascia letting them come out thru the conjunctiva well back. By tightening these three stitches I could use them as "guy ropes" against the point anchored to the cornea, to make the patch fit more snugly to the eye, and at the same time loosen up the conjunctiva with which to cover it. These stitches were then tied and the patch entirely covered with the conjunctiva.

I have seen the boy several times since, and the eye needed no further interference beyond removing the stitches.

In July, 1919, the patch had every appearance of doing all I could wish. His vision was then 20/70. Tension was 22 mm. with McLean tonometer, and with his correction of +1.00 S ⊃ + 2.50 C ax 70° he had 20/20 vision under mydriatic.

I believe from my single experience that fascia lata has proven to make a live subconjunctival graft of great strength, which is tolerated by the cornea. It can easily be gotten under local anesthesia from the leg just above the knee, thinned down and cut into any desired shape. All of the thinning down should be on one side, leaving the other smooth surface to go next to the sclera and the opening. While I have never used it for the purpose, I believe fascia lata could be better used than any other substance for replacing tarsal plate, should this be desired.

HEREDITARY CATARACT IN CALVES

CHARLES P. SMALL, M. D.

CHICAGO, ILLINOIS.

The occurrence of hereditary cataract in calves was recently demonstrated upon five blind animals in the experimental department of the College of Agriculture, University of Illinois. The youngest animal examined was a heifer, four months old; the oldest a heifer, one year and eleven months old. Two bulls, about six months old, and a heifer, seven months old, completed the number.

With the exception of the youngest animal, both eyes of all the others presented mature cataracts. Small chalky dots of further degeneration in the lens substance were seen in most of the cases. Because of the oval shape of the pupil, it was possible to view the fundus thru the clear opening between the edge of the opaque lens and the nasal border of the iris. In several of the eyes the lenses, apparently undeveloped in size, were seen thruout their entire circumferances, giving the appearance of a glass marble suspended in the clear vitreous. The other ocular conditions were practically identical in all the animals. Intraocular tension, so far as could be judged, was normal. There was no ciliary nor conjunctival congestion. Light perception and a good degree of light projection was found in all cases. The pupils responded readily to light.

Both atropin and homatropin were employed, similarly to its use in the human eye, to observe the mydriatic effect. Full mydriasis was obtained in about one hour. In most of the eyes, dilatation of the pupil was uniform; in a few eyes there were slight points of posterior synechiae. The fundi were examined by an electric ophthalmoscope. The normal tapetum was seen, but very faintly or not at all. In other respects they appeared normal.

In the case of the four months old animal, the cataract was apparently soft; there was a loss of transparency, and the opaque radiating striae were faintly in evidence.

Thru the courtesy of Professor J. A. Detlefsen, of the Laboratory of Genetics, and his associate Mr. W. W. Yapp, who have in preparation a paper on the genetic aspects of this condition. It may be stated that their observations thus far carried out, correspond very closely to the Mendelian theory. Eleven blind calves have been observed, where they might have expected to find 9.375.

Of the five animals reported here, four came from a mating of the son of "Old Homestead" to his own half sisters, which were daughters of "Old Homestead." That is "Old Homestead" was mated to a number of unrelated females. The daughters from this mating were mated to a son from this mating. The youngest animal was derived from a daughter of "Old Homestead," mated back to "Old Homestead," her sire.

TRAUMATIC CATARACT. LENS ABSORBED WITHOUT OPERATION.

JAMES H. MCKELLAR, M. D.

LOS ANGELES, CALIFORNIA.

Believing that in some cases of traumatic cataract, operation is advised too readily, I present the following three cases, showing what nature will at times do, unassisted by operative interference. This is in no way a criticism of operation when absorbtion does not take place otherwise within a reasonable time; or when complications clearly indicate it. In such a case as II, I believe operation should always be advised. These cases are of interest also, in that they differ essentially in character from one another.

The first case is one of subconjunctival dislocation of the lens. The second of traumatic cataract, due to contusion; the third of traumatic cataract, due to punctured wound.

In each of these cases, practically the only treatment used was rest and instillation of atropin solution, with iced compresses at intervals at first, (if we except Christian Science treatment in the second case); yet in each case the ultimate result was as good as it could possibly have been, had the operation been resorted to.

CASE I. Negro bootblack, age 45, came to my office in April, 1909.

History—The night before he had engaged in a fist fight, and was struck on the right eye. Had not been able to see plainly with that eye since.

Examination — Lids swollen. Globe rather soft. Mass under conjunctiva temporal to limbus, which apparently consists of iris and cataractous lens. Conjunctiva unbroken. Break in the continuity of iris, corresponding to the portion seen under the conjunctiva. Eye aphakic, media fairly clear, fundus normal.

Diagnosis—Traumatic dislocation of lens and iris subconjunctivally. Iridodialysis. Rupture of globe.

Treatment—Rest and atropin.

Result—Eye was soon quiet, and tension normal. Dislocated lens became entirely absorbed. Dislocated iris shrunk. I was able to follow this case for a number of years. He had no complications of any kind during that time, and vision was good with correcting lens.

Case II. Sept., 1913. Boy aged 10.

History—Stated that he had been struck on the left eye, the day before, by a schoolmate. Had not been able to see with that eye since.

Examination — Conjunctiva injected. No wound of cornea or conjunctiva. Lens cataractous and swollen. Tension normal.

Diagnosis—Traumatic cataract.

Treatment—Rest and atropin. Iced compresses at intervals.

This case progressed favorably for several days, then I saw him one day, with marked pericorneal injection, and exceedingly high tension. I advised operation, which advice was refused. The case passed from my observation for several months, then one day the mother brought the boy to see me (partly, no doubt, that I might be enlightened as to the beneficent effects of Christian Science treatment, which she stated the boy had been receiving).

The eye was entirely free from irritation. The pupil was clear, the tension normal, and the vision was approximately normal with correcting lens.

*Case III. Jan., 1918. Boy, age 6.

History—Mother stated that several days before he had been playing with a hat pin, which had struck him in the right eye, since which time he had not been able to see with that eye.

Examination — Pericorneal injection. Punctured wound of cornea. Lens swollen and cataractous; tension normal. Iris uninjured.

Treatment—Rest and atropin. Iced compresses at intervals for first few days.

Result—Lens became absorbed uneventfully, and by October, 1918, pupil had entirely cleared. The eye was quiet, and with correcting lens vision was approximately normal.

---

*This case has been reported in the California State Journal of Medicine.

SOCIETY PROCEEDINGS

AMERICAN OPHTHALMOLOGICAL SOCIETY.

FIFTY-FIFTH ANNUAL MEETING.

Atlantic City, June 14-17, 1919.
President, DR. LUCIEN HOWE
of Buffalo.

Requirements of Ocular Examinations for the Army.

DR. WILLIAM H. WILDER, Chicago, considered these in detail. The changes made in such requirements since the beginning of the recent war have been chiefly in the direction of discriminating more closely between those conditions that actually incapacitate for service and those that do not. The general tendency has been to admit for special service those with defects that would incapacitate for some other branches, but do not interfere with the particular work of that special branch.

As to malingering, he found it impossible to ascertain the visual acuity of malingerers who consistently adhered to the claim that they could not see the largest test letters. But it was difficult to prove that they were making a false claim, or that they had vision sufficient to meet the requirements, altho they might be proved to have enough to avoid objects likely to hurt them.

DISCUSSION.—Dr. E. C. Ellett, Memphis: All who had to do with the work in the camps must have marveled at the sort of men that occasionally got in. I saw one man brought in on a stretcher, with a shortening of one femur, so that he could not walk a step. One was mentally deficient, so that the family never allowed him to go about without an attendant. I think that the way in which these things happened was that the men were summoned to appear before a draft board, and if they did not do so, they were summarily put into the service. I saw another who had been made a noncommissioned officer and recommended to be sent to a training camp for officers, and was found to have an artificial eye. The camp I was in had a board that worked most efficiently. All the men who came to camp went before that board, and every man whose hearing or vision was not normal was immediately referred to the proper specialist for more complete examination.

Dr. Allen Greenwood, Boston: I just want to discuss one point, reclassification, which was the problem that came before the ophthalmologists in France. It was the subject of a great deal of thought on the part of Drs. Black and Derby and myself. Reclassification was asked for because the former classification was not clearly worded.

Dr. Wilder, closing: There was one point that I wished to bring out, in connection with the tests of malingerers that I found very useful. It is the ordinary prism test; using the fourteen or sixteen-degree prisms and putting the apex above and the base below. This makes two charts on the wall. You ask the man to read the first one, and then the other. You demonstrate that he can see two with the ordinary prism test. Then, when you raise it, you demonstrate, when he reads from the lower chart, that he is reading with the alleged blind eye.

The test for visual acuity, I think, is not very valuable for the class of people who insist that they cannot see well with either eye, and who habitually do not read the top letter of the chart. We scattered nails on the floor and had them walk around without their shoes, and they studiously avoided injuring their feet. We thus found cases of malingering that we could not find in any other way.

Dr. Alexander Duane, New York: I have succeeded in detecting two cases of malingering by another application of the prisms: one that would produce, if the patient were really using two eyes, a confusion; but that if he were really excluding one eye, would not cause confusion. I have succeeded in that way in convincing the friends of the person, in accident cases, that he was either selfmisled or misleading them.

The Eyes of the Signalman.

Dr. Alexander Duane, New York, read the paper published in full in this Journal, p. 555.

Observations of an Administrative Officer.

Dr. Walter R. Parker, Detroit, gave an outline of the history of the recognition of specialties in the army medical service; and the organization and work of the Division of Surgery of the Head. Important functions were the selection of officers fitted for the special duties involved, the training of such officers in their specialties, the selection of special equipment required to make their work effective, and the organization of agencies and methods for assisting in the restoration and reeducation of the soldiers requiring special treatment.

It had been extremely difficult to get specialists properly placed near the front so as to make their special ability available. Altho the specialties of brain surgery and dental surgery were likely to be dropped, those of ophthalmology and otolaryngology would be continued in the permanent organization of the army medical service after the war.

Discussion.—Dr. Allen Greenwood, Boston: The work that was done abroad was predicated on the work that was done in the Surgeon General's office; and no man in America has done so much for the specialties in the army as Colonel Parker. It is due to his efforts, his workings with the general surgeons and convincing them of the necessity for the specialists, that we have gained what we have today for ophthalmology and the other specialties.

Dr. George E. de Schweinitz, Philadelphia: Colonel Parker has directed me to make an addendum to his paper. It is perfectly true that cantonment instruction in the head specialties, particularly ophthalmology, was not a brilliant success; but there were two exceptions. They had a very excellent school under the control of Colonel Todd, altho whether particularly in ophthalmology or not, I cannot state. Another successful school was at Camp Lewis, where a great deal of trouble was taken to instruct not only the ophthalmologists, but also those interested in the problems of ophthalmology as a specialty, and in its broader relations to general medicine.

Ocular Manifestations Following Exposure to Poison Gas.

Dr. George S. Derby, Boston, Mass., read a paper pointing out that the Germans first began to use gas for the purpose of disabling their enemies. It was at first sent over in the form of drifts or clouds. Among the varieties thus sent over was the so-called *lacrimatory gas*, which caused burning pain, copious lacrimation, injection of the conjunctiva and photophobia. There was also fine exfoliation of the epithelial covering of the cornea. The milder cases recovered very quickly, the corneal lesions showing no tendency to extend. The more severe cases were usually well within two weeks.

Much more serious were the injuries inflicted by *mustard gas*, which was first used in July, 1917. It was sent over in shells, and caused sneezing; painful irritation of the nose, throat and eyes; and sometimes vomiting. Its action was not noticed until from two to six hours after exposure, when severe erythema of the skin developed, followed by blistering, the moist parts of the body being more severely affected. Respiratory symptoms also developed; and in severe cases, bronchitis and secondary pneumonia. There was profuse lacrimation and considerable injection of the conjunctiva.

The mild cases constituted seventy-five to eighty per cent of those affected. In the remainder, the more severe cases, the lids showed redness and swelling, and often the formation of bullae. They were tightly pressed together, and all attempts to open them caused severe pain. In these cases, the cornea is markedly injected, and may show chemosis. In severely burn cases, there is often an area of solid white edema of the conjunctiva in the palpebral fissure. The corneal lesions are also of varying severity, principally consisting of a roughening of the epithelium with irregular grayish scattered areas of opacity. In very severe cases, there is a whitish band traversing the cornea in the area of the palpebral fissure.

Eyes that are bandaged are made worse. It may cause secondary infection of the cornea. The lesions produced by mustard gas are in the nature of a chemical burn. In mild cases, recovery may take place in from one to two weeks. The moderately severe cases may last from four weeks to two months; and it may be four months before the most severe cases can return to duty. The nervous effect produced by the severe irritation of the eye sometimes produces a neurotic condition that is hard to overcome. The man fears that he is going to become blind, and often the general condition is impaired.

The gas mask will protect the eyes from the effects of mustard gas; but if they have been exposed to it, they should be washed out frequently with sodium carbonat or boric acid solution. A drop of some oil, such as liquid albolene, should be instilled. When there is much blepharospasm and irritation, atropin should be used. The eye should not be bandaged, but a shade or a pair of dark glasses should be worn. In cases of secondary infection, protargol or argyrol should be employed. Cold bathing and the instillation of a weak solution of sulphat of zinc are also of value. The patients always recover with normal vision, unless a severe involvement of the cornea has taken place.

Discussion.—Dr. F. H. Verhoeff, Boston, Mass.: At Camp Devens I saw a number of these gas cases when they returned to this country. Their eyes were still in a very much irritated condition. Sometimes they quieted down somewhat; but the slightest irritation gave them a great deal of photophobia and made them unable to use their eyes. Exposure to cold might start them up. I saw all grades of sensitiveness. In a few cases, there was permanent corneal involvement, with vision cut down to 20/100, and there seemed no prospect that vision would get better.

I found nothing that would relieve this irritation. Weak cocain solution would make them worse, if kept up for any length of time. Castor oil seemed to produce a little benefit in some cases, but I finally decided to use nothing; and they did better on that than on anything else. The question arose in my mind whether these eyes that had been badly exposed, even without corneal involvement would ever reach a normal condition. It seemed to me that the men would have more or less trouble all their lives.

Dr. Walter B. Lancaster, Boston, Mass.: Dr. Derby spoke of the importance of starting these men right, by not letting them think that their trouble would be serious. There are two lessons to be drawn from these cases. One, the importance of starting the patients right, so that they will not fear the loss of their sight, or permanent disability; and the other is that similar things occur in private practice. Very slight injuries happen, and all the troubles of the patients are attributed to these injuries; while the truth is that the injury was only an insignificant factor, and simply started the ball rolling, the trouble being kept up by the patient's attitude towards it.

Dr. Allen Greenwood, Boston, Mass.: Several points that Dr. Derby has brought out I wish to emphasize. One is the early treatment of these cases. We made efforts to have them treated within five or six miles of the front line, and the gas service was under the charge of a special medical officer. He wrote out for us some circulars, to be sent to the regimental surgeons and medical officers at the front, calling attention to the points that Dr. Derby has mentioned, particularly the nonuse of bandages. I saw one case that had come from the front in which both corneas were destroyed; and the patient said that a bandage had been on both eyes and left there for three days, during transportation. Colonel Derby has told you that he went to one hospital and removed many bandages at one time. That bandaging was done away with later. In the circular, we advised avoidance of bandaging, early treatment and care not to hospitalize these cases. They were prone to become hospitalized. I saw one man who had been in the hospital for three months, in a dark room, and was in very bad shape. The only treatment that I advised was to send him out doors the next morning, without colored glasses or eye-shade, to work in the garden. That treatment produced a cure within twenty-four hours, showing the psychic influence on the condition. In the severe cases, it is similar to any caustic burn. Those who have seen mild burns, with the whitened conjunctiva lifted up around the cornea, and the usual corneal involvement that follows such severe burns of the conjunctiva, will have a good picture of these cases.

It is well to call attention to the really severe results following the use of gas in the war. One experience will always remain with me. In a little hospital six miles back of the firing line at Baccarat early in the spring of last year, there were brought in, during one afternoon, one hundred and fifty men who had been badly gassed. They took out thirty-five dead bodies from the ambulances that had contained one hundred and fifty living men when they left the front. All had been badly gassed by phosgene and mustard gas combined.

Dr. Edward Jackson, Denver: I saw a patient accidently exposed in the manufacture of gas in this country about seventy-two hours after exposure. The trouble with the eyes had appeared about thirty-six hours after the probable time of exposure. There was a free discharge from the conjunctiva, which consisted almost wholly of young epithelial cells. There were no polymorphonuclears, and no bacteria whatever were found.

Dr. Nelson M. Black, Milwaukee: Dr. Derby and Dr. Lancaster have called attention to the fact that it is important to start the men right, with the idea that they are not going to lose their eyesight. Dr. Derby hit upon an admirable plan. The men felt that they must have some protection from the light. As eye-shades were practically unobtainable, and dark glasses few and far between, Dr. Derby suggested to the nurses and men in the service to utilize the blue paper that came around absorbent cotton, and make eye-shades out of that. The result was that many men, who wanted to keep their heads down and their hands over their eyes, could go out and face the light that they had been so afraid of, by making small shades out of blue paper and putting it under their overseas caps. In a very short time, being guyed by men of their acquaintance for wearing this shade, it would come off, and they would be on the high-road to recovery.

Dr. Derby, Boston: There are three brief points that I wish to discuss. First, in regard to what Dr. Verhoeff said, that the experiments made under the direction of the medical war service showed that it is not improbable that hypersensitivity to mustard gas may occur in cases showing a persistent thymus and characteristic lymphoid hyperplasia. Second, eye-shades or dark glasses must be worn so long as the action of the atropin still exists. You cannot tell a man to take off the shade until that has disappeared. The third thing that I want to refer to is that Warthin and his associates have an excellent exhibition of slides of microscopic and other photographs at the Steel Pier, with the other exhibits; and it certainly is well worth seeing.

Primary Treatment of War Injuries to Orbits.

Dr. Allen Greenwood, Boston, read a paper in which he called attention to the importance of preserving all tissue possible, in opposition to what was generally done in the case of wounds elsewhere. Primary suture of lid wounds, provided there is not a tremenous loss of tissue, is always indicated at the earliest possible moment and with the greatest accuracy. Any debridement of lid wounds, such as is performed in other parts of the body, is absolutely contraindicated.

Small foreign bodies in the orbit should be left alone unless they are causing some trouble. Larger and more devastating foreign bodies in the orbit can be removed if this is possible without destruction of living muscle and nerve tissue.

DISCUSSION—Dr. George S. Derby, Boston: I should like to emphasize one point that Colonel Greenwood has emphasized; and that is, leave foreign bodies in the orbit alone, unless you have to go after them, or unless they are large. A great many were left in, in France, and have been there ever since; and the men are apparently perfectly well. The orbit is a bottomless pit, it is often hard to find even a fair-sized body, and a great deal of damage may be done in searching for it.

Dr. George E. de Schweinitz, Philadelphia: Colonel Lister speaks of the comparative infrequency of hole in the macula as compared with other concussion lesions. That is not the experience in the concussion lesions that have come back to this country. At No. 11 and other camps, we have had a proportionately large number. Of the twenty-six severe concussion injuries that I examined, I found five typical holes in the macula—a pretty large proportion; and a great many have been reported since.

Dr. Derby: I was rather surprised at Colonel Lister's statement; because, working in No. 83 Hospital, I saw more holes in the macula than I had ever seen in my life before.

Dr. Edward Jackson, Denver: In relation to the frequency of holes in the macula, the examination of recruits for our army, including a careful ophthalmoscopic examination, showed that holes in the macula were much more frequent than the literature previously published would have led us to believe. I have a considerable series of cases that were found in that way. The most of these patients could give but little history of the cause of the hole. In many cases, the injury had probably occurred in early childhood; and the patients had never consulted an ophthalmologist or had their eyes examined with the ophthalmoscope.

Dr. Nelson M. Black, Milwaukee: Dr. Greenwood mentioned the fact that many of the men come across with such bad conditions of the orbit. In the early portion of the work in our army over there, when the evacuation hospitals were first organized, the ophthalmic section was not allowed to attach ophthalmic surgeons to them. Later, permission was given to do this; and, in ignorance of the conditions existing, the ophthalmic section did not select the most highly qualified ophthalmic surgeons for this work. This was an error; as the primary surgery is what counts in the end. As the result, in a large number of cases, an attempt was made at removal of the eyes, by the means that Dr. Greenwood speaks of, by the general surgeon.

Another factor was that in these evacuation hospitals, when the eye men were assigned to them, the percentage of eye wounds being relatively small, the eye man was not given a position on the general surgical team. He was given various other comparatively unimportant duties to do. Then, when a case came in, a chief on the surgical team would ask for the eye man; and considerable time was spent in finding him. When he was found, he had to get his instruments ready; and that took time. As the result, the surgical chief decided against sending for him, and enucleated the eyes himself.

Later, the suggestion was made by Colonel Greenwood that the eye surgeon be made assistant on a general surgical team to a general surgeon, and that tirage officers be requested to send all eye cases to this particular team. The general surgeon, in these cases, acted as assistant to the eye man. This change was made only lately, and did not become generally effective; but a great many officers acted on Colonel Greenwood's suggestion and did that. In the Third Army it was ordered that the eye man should be a member of a surgical team and assistant to the general surgeon, so as to be on hand at a'' times. When he was not on duty, the cases that came with eye injuries were sent to the ward. Then when the team to which the eye man was attached came on duty, the men's eyes were attended to.

Dr. Greenwood: I want to say that the suggestion of putting an eye man on the surgical team was made by Dr. Black, and not by me. I was glad to adopt his suggestion, which seemed exceedingly wise; and it worked out well, particularly when Dr. Black or Dr. Derby was a member of the team. The lack of ophthalmologists in the evacuation hospitals was a grave one in the early days. All had to go to the front and take positions in evacuation hospitals, and go from one to another during the stress of work, and try to cover these cases.

I want to draw one little picture of an evacuation hospital in time of stress. During the height of the Argonne offensive, I went to the most forward of the tip of the forest. It had been opened only two days. It had been raining a week, and was still raining, when I arrived there. The roads were a sea of mud. The hospital was in an old chateau, with tents scattered in the grounds around it; and practically every ambulance went up to the hub in this mud. The nurses and officers were wearing rubber boots; and those that were there to help out or to see how things were going wore overshoes. I entered the hospital at three o'clock in the afternoon. Every ward was crowded. Ambulances were coming at the rate of one every two or three minutes. Colonel Tracey, who had charge of the shock work, had four wards filled with shock cases. Among these cases were ten or fifteen men whose faces were practically ruined. I assisted the ophthalmic surgeon the best I could to patch them up temporarily.

I wish I had the power of speech and the ability to draw word pictures, so as to draw for you a picture of that hospital—the rain coming down in torrents, the sea of mud, the shock ward filled, a little heater at the foot of each bed, the men looking as if at their last gasp, ambulances coming in every two or three minutes, and the drivers exhausted.

Thirty miles away, we had a special hospital for head cases; but it seemed a crime to ask the drivers to go thirty miles farther, to take these cases to the eye hospital. This shows the necessity of having a competent ophthalmic surgeon right at the spot.

Penetrating and Perforating Wound of the Eyeball with Diagnosis and Treatment of Retained Foreign Bodies.

Dr. William T. Shoemaker read a paper on this subject, published in full in the Journal, page 590.

Discussion.—Dr. F. H. Verhoeff, Boston: There has long been a general misconception as to the danger of sympathetic ophthalmia following retained foreign body, and I agree with the speaker that this is much exaggerated. During the past nine years, I have examined a large number of eyes having the typical picture of sympathetic ophthalmia; and in not one have I found a foreign body. On the other hand, I have examined a great number of eyes in which foreign bodies had been retained for a number of years; and none of these cases showed sympathetic ophthalmia. There is more danger of the latter I think, in removing the body than in leaving it in; because you produce so much more trauma.

Regarding removal of the body, I would say that I prefer the anterior route, whenever it is possible to use it. We produce so little damage to the anterior parts of the eye in removing it that this need not concern us. Another thing I have noticed is that when we attempt to remove the foreign body through the anterior chamber, it sometimes becomes lodged behind the iris. It comes out until it strikes the sphincter, which is a very rigid ring; and then the foreign body catches on the sphincter. The natural tendency is to put the magnet opposite and try to draw it out; but it would be better to have the traction tangential to the pupil. In that way, the foreign body will ride over the sphincter and come out in the anterior chamber. If it is caught very firmly, I should pull it back a little bit, and then it would come out easily. I have seen eyes greatly mutilated by attempts to get foreign bodies out that were caught in the iris.

Dr. Samuel Theobald, Baltimore: Regarding the retention of foreign bodies in the eye, if they are aseptic and incapable of undergoing serious change, they may not damage the eyeball or produce serious consequences. I have seen a patient who, about forty years ago, got a spicule of glass in his eyeball. It had lodged in the anterior chamber under the upper margin of the pupil. While the patient was in my office, it fell down behind the iris. There was a sharp inflammatory reaction; and undoubtedly, as that subsided, the bit of glass was encysted. From then until the present time, the patient has not been able to notice any difference between the two eyes.

Dr. George S. Derby, Boston: Whether I agree or not with the Moorefields School of London, as to the advisability of extracting foreign bodies anteriorly except the very large ones, I must certainly admire tremendously their very splendid techniq for extracting foreign bodies thru the anterior chamber, as I saw it in the No. 83 General Hospital at Boulogne. The foreign body was pulled into the anterior chamber; and an incision made thru the clear cornea with a selected keratome, very carefully, so that little aqueous was lost. The foreign body was then pulled forward by means of a magnet, after which the small magnet manufactured by Weiss, in London, which works on some dry cells was placed over the foreign body, which was thus drawn up to the wound and emerged from it, without the necessity of introducing the instrument into the anterior chamber.

Dr. C. F. Clark, Columbus, Ohio: I have been taught that a foreign body in the eye, in the course of forty, fifty or sixty years, will affect the other eye. Is it not too soon to draw any conclusions regarding sympathetic ophthalmia from war experiences? Has sufficient time elapsed?

Dr. Nelson M. Black, Milwaukee. In regard to the question of the occurrence of sympathetic ophthalmia from retained foreign bodies, I can say that we saw comparatively few cases of this in proportion to the large number of eye injuries. Comparatively few of these injuries were due to retained foreign bodies that were nonmagnetic, and cutting injuries, were due to other causes than those that would leave foreign bodies in the eye. I was wondering whether a possible factor in not having more sympathetic ophthalmia could not be the injections that the men received—typhoid, paratyphoid and tetanic injections—at the time of injury. Is that a factor worth considering?

Dr. William Tarun, Baltimore: I should like to speak of a few phases of this subject. One is the advisability of enucleating an eye during ophthalmitis. Dr. Chisholm, who had a hospital at Baltimore, has removed three thousand eyes for various lesions. A good many were having ophthalmitis, and he has not seen a single case of meningitis develop after removal of an eye for that cause.

Another phase is the development of the lesion in the eye itself. Dr. Randolph asked me to see a young man, an employe of the Baltimore and Ohio Railroad, who had had an injury some years before. Dr. Randolph, at that time, had removed a piece of steel from the eye, and the preservation of the eyeball was perfect. The macular region was destroyed, and he had only excentric fixation with the eye. Two months ago, he returned with a history of being struck on the opposite eye. Dr. Randolph found a small foreign body in the left eye. The right was the one affected. I was asked to see the man, and to do whatever was necessary. The X-ray showed a small foreign body in the vitreous, more or less movable as the eyeball was moved, and some short distance posterior to the lens. A number of hemorrhages were seen in the vitreous; and a number on the retina below. Vision was then 20/60; and the question was whether to leave the eye alone or remove the foreign body.

In view of the fact that he had had an injury to the opposite side, and that removal of this body would mean further destruction to the eye, I suggested that the eyeball be left alone, and that the patient be put on atropin, ice-compresses, rest, glasses and constitutional treatment with salicylat of soda and purgatives twice a week. I also suggested that he have his sinuses X-rayed, the teeth looked after and the tonsils examined. He had all this done, and there did not seem to be anything wrong. His vision grew better, and came to 20/15. The foreign body was still present. The irritation had subsided, and everything was perfectly quiescent. It is quite a responsibility to determine exactly what shall be done with this man. He has a bad eye on one side, and operative interference on the other side is needed. We are just keeping him under observation. I am a believer in Elschnig's work. He has thrown much light on sympathetic ophthalmia. I do not think that it goes to one eye from the other, but believe that it is due to a constitutional cause. If those causes such as pus conditions about the body are eliminated, and the injury is of such character that the pigment substance had been destroyed from the entrance of the foreign body, I think that it is safe to allow the foreign body to remain, without the prospect of causing serious damage to the individual in after life. The foreign body in this case was a piece of steel.

Dr. Allen Greenwood, Boston: I want to suggest that probably we shall never come to an agreement as to the posterior and anterior routes. The decision depends upon the conditions present and upon where the work is being done. If we are considering Dr. Shoemaker's paper, we must remember that his work was connected with the military service in the very front line hospitals. In such circumstances the anterior route for tiny foreign bodies probably offers the better operation; because it is difficult to get X-ray localization. If you have a small body in the eye at a place where the X-ray can be used, my preference is to draw it through a small opening in the vitreous, nearest the point where the foreign body lies. You must judge which route is the best according to circumstances. The size of the foreign body and the personal equation must be taken into consideration.

As far as sympathetic ophthalmia is concerned, the war is so recently finished that one cannot give an opinion. I saw only one case during my entire service as consultant in the various hospitals. In that case, there was a foreign body in the eye, with a history of iridocyclitis of three weeks' duration. The eye was removed, and the sympathetic condition, uveitis, on the opposite side disappeared. I think that cases of sympathetic ophthalmia are going to be much less frequent than one would expect, considering the multitudes of ocular injuries. The condition has lost a little of its dread to the man who sees service. The condition of the opposite eye depends on whether there is an iridocyclitis that persists, in addition to an inclusion of the foreign body.

Dr. T. B. Holloway, Philadelphia: I wish to call attention to a complication in these cases that, while extraocular, may have wide-reaching effects. The surgeon at the Naval Hospital in Philadelphia referred to me the case of a man who had injured his eye. I found that a foreign body had plowed its way directly through the lens and had lodged in the vitreous. I had no difficulty in drawing this large foreign body into the anterior chamber; but while it was approximated against the posterior wall of the cornea, I had difficulty in getting it through the corneal incision. I asked the Resident to hand me an applicator, with which I depressed the lips of the wound. Another Resident picked up the porcelain-lined instrument tray and brought it close enough to the heel of the magnet to draw the tray out of his hands. After the atmosphere cleared, I found that this hunk of steel had been extracted very nicely and was attached to the end of the tip of my magnet. I mention this because a nurse or someone else may inadvertently pick up one of these trays and bring too close to the magnet, and the result may prove disastrous to the eye.

Concerning the Ocular Phenomena in the Psychoneuroses of Warfare.

Dr. George E. de Schweinitz, Philadelphia, read a paper upon this subject. It dealt with cases that are usually spoken of as due to shell-shock, altho, as he pointed out, the use of this term was so confusing and misleading, that it had been forbidden in army reports. The vast majority of these cases have all the characteristics of "peace time neuroses with a war-time coloring," and that "the neurosis is a maladjustment of the individual to his environment," with the understanding that the results of a true neurosis, be it one of war-time or one of peace-time, are not conscious or voluntary. Many of these men had been confronted by what was for them an intolerable situation, from which the conditions that presented necessarily arose. These individuals were generally neurotic and biologically inferior, and symptoms arose unconsciously and by suggestion.

In general terms the cases include shell concussions, that is, those patients who have obvious physical lesions, or at least symptoms which may be assumed to interpret physical lesions — a small group not discussed in the paper except in incidental mention; and the large group of shell hysterias, psychoneuroses, and war shock. From the ocular standpoint, altho it is admitted that it is difficult to make sharp distinctions, for convenience sake the following classification is adopted. (1) Various types of amblyopias and amauroses, including disturbances of color vision—types which have in civilian practice been included under the terms incomplete and complete anesthesia of the visual sense; (2) asthenopias and anomalies of accommodation; (3) anomalies of the iris movements (pupil phenomena); (4) anomalies of the eyelids and eye muscle movements; (5) cases not classified in the above groups.

The paper is illustrated with a number of case histories and a series of charts of the visual fields.

Discussion.—Dr. William H. Wilder, Chicago: In a time of crisis and stress such as these men have all gone thru, it is extremely difficult to differentiate wilful from unwilful manifestations. Possibly it is quite as difficult as it would be in civil life, in the case of an individual seeking damages. It seems to me that some of the manifestations are those of what we might call fatigue of the nervous system,—fatigue that is brought about by what some of the older clinicians used to describe as an insult to the nervous system. Hence, in some of the cases of hysteric manifestations that you see, this may be an explanation. I refer particularly to the peculiar inversion of the color fields seen in hysteric manifestations.

I have seen a case, such as Dr. de Schweinitz mentions, of complete abolition of the color sense, apparently from shell shock. This young man, a soldier, came to me for examination from the Vocational Board of Chicago. He was to be prevented from going into his former vocation, that of an engine man, or fireman, because of complete color blindness. I do not know the previous history, but he stated it as a fact that when in the service of the Rock Island Railroad, which requires careful vision tests of its employes, and perfect color sense, he was absolutely normal for red and green. There were no lesions of the eye discernible. The fundus was perfectly normal, and yet he must be excluded, and probably will be from railroad service on account of his color defect. This is the case that has come under my observation.

Dr. Allen Greenwood, Boston: One of the manifestations of the war neurosis created by "an intolerable situation" is the deplorable fact that some of the men who came to the evacuation hospital had self-inflicted injuries. They were in such numbers that it became quite apparent; and it also became apparent that the condition was more or less infectious, coming at certain times and among certain groups of men. I remember serving as tirage officer of No. 7 Evacuation Hospital one night, and I kept a record of the names of the men and where they came from. During that night, I found twenty-five men who had either shot off the middle or fore finger of the left hand, or shot a bullet between the big toe and the first toe or between the first and second toe. Those were the four principal locations. A few had shot themselves thru the palm of the left hand. I doubt, from my observation, whether these men were really cowards. They came to an intolerable situation, and found that men were being sent back with minor injuries; so they inflicted these minor injuries on themselves.

Another night, when assisting the general surgeon, I did not see such injuries.

Dr. de Schweinitz: The cases that Dr. Wilder has referred to belong to a group that I did not discuss here, altho I did in my paper. They are the so-called exhaustion cases, and belong to the psychasthenias. They almost invariably got well by rest, and the condition usually disappeared comparatively soon.

I should like to add just two things more. I spoke of blindness. In a certain number of cases there was a distinct physical reason for the blindness. Some had a disease of the retina. They are referred to in a number of papers—among the rest, Babcock's paper; so it was necessary to decide carefully whether there was an organic lesion. In one case, the only one was a diminutive lesion, like a little cross, right in the macula.

Another thing is that, in the recovery from blindness, it was interesting to observe that the shooting eye was the last to recover. This point is mentioned by Parsons in his article. It was the last eye to accept the suggestion of recovery.

Trachoma in the Camps and Hospitals of the Army.

Dr. Burton Chance, Philadelphia: From his experience in Camp Jackson, he concluded that in the American army trachoma did not constitute a serious problem. His statistics could not be brought to the close of the war since reports covering the latter part of the time had not been issued. During the larger part of the period the records showed that at Camp Jackson, but 35 men had been rejected from the service, and only 26 had been treated for trachoma at the hospital.

Discussion.—Dr. William H. Wilder, Chicago: My impression is that the number of cases of trachoma that we saw in Camp Taylor is considerably larger than that mentioned in Dr. Chance's paper. I do not know how our records went in; but Major Barton, who later became head of the Department of Ophthalmology, after he left the camp, told me that according to the early statistics of 1918, something like two hundred and seventy-five cases had been sent from the camp because of trachoma. This number included some doubtful cases, but not a large percentage; because we early inaugurated the practice there (the Review Board, I mean), of sending back any draftee who had symptoms that we regarded as suspicious. We did not want to keep any such cases for treatment for a number of weeks.

Altho there was a strong effort made by the Public Health Service to have a separate ward set aside for the treatment of these cases, it was deemed inadvisable by Col. Aller; and I thought that was wise. He discharged these men and asked the boards to return sound men. The reason that there was some trachoma in Camp Taylor was that the men there were drawn from Indiana, Kentucky and the southern part of Illinois. Those who are familiar with the Middle States know that there is a great prevalence of trachoma among the native born in the southern part of Illinois. The population there is made up of immigration which came from Eastern Kentucky and southern Indiana in the early days. In that region, between the Mississippi, the Ohio and the Wabash rivers, there is a great proportion of trachoma among the native population. Some of these fellows from Kentucky were cute enough to imagine that they could deceive the surgeon. They set up an inflammation so much like trachoma as almost to lead to their rejection. They produced a conjunctivitis that was extremely puzzling. They would get well; and then, in the course of the day, they would have a marked recurrence. I put my sergeant on one man's track, and he found that the man was rubbing into his eye carbolic acid furnished by a kind druggist at home. Another man, a friend of the first, hesitated to use that, and rubbed in ordinary soap. Another used ordinary camp dirt, and produced a conjunctivitis, which, however, did not have the features of trachoma. These men were taken before a court martial and sentenced to three years at hard labor.

Dr. Nelson M. Black, Milwaukee: In 1918, I was representing ophthalmology in the Surgeon General's Office, and was ordered to the infected districts of eastern Kentucky and Tennessee, to observe the treatment instituted by the representative of the United States Public Health Service, Dr. McMullin, and make a report, to be used in the treatment of cases of trachoma in the army. I was also requested to make suggestions to the Quartermaster General's Office as to accepting infected individuals in the draft. The observations that I made, conclusively proved that trachoma, under the treatment instituted by the Public Health Service, could be cured; and in a time sufficiently limited to permit of the man's being available for service. Recommendations were made that a trachoma concentration camp be formed, to which should be sent men from the various camps for observation, treatment and training. The general staff, however, did not see fit to accept these recommendations; so the trachoma concentration camp never developed. However, the next article's reference to acceptance to the draft included trachoma as a remediable disease. Later, that was thrown out; and all trachoma cases were to be rejected. Still later on, they were to be received for treatment in the base hospital, and if not cured in a certain length of time, were to be discharged.

As to the question of the transference of contagion in our armies, I think that the training that the men received in personal hygiene and the establishment of an Ophthalmological Section in the Medical Department of the Army, made the possibility of infecting the army absolutely nil. The men took care of their eyes. If they had eye trouble, they went to the regimental surgeon, who sent them to the field hospital; and from there, they were sent to the base hospital, where, if they had trachoma, it was taken care of. So if a man had trachoma, even in a stage in which infection was evident, there would be no chance to infect the army at large, because of the precautions due to personal hygiene and the establishment of an ophthalmologic department in the army.

(*To be continued.*)

COLLEGE OF PHYSICIANS OF PHILADELPHIA SECTION ON OPHTHALMOLOGY

April 17, 1919

Dr. William T. Shoemaker,
Chairman

Bilateral Congenital Entropion.

Dr. Wm. Zentmayer presented an infant upon whose eyes he had performed an operation for congenital entropion of both lower lids. The removal of a crescent of skin with a few of the underlying fibers of the orbicularis had been sufficient to cure the condition. Mayou states that these conditions are never true entropion but a malposition of the cilia. In this case the margin of the lid was rolled in also, so that the cilia were turned down into the cul-de-sac. It may, therefore, be properly termed congenital entropion.

Congenital Pigmentation of the Sclerotics.

Dr. Zentmayer showed R. C., aged eighteen years, a Russian Jewess. Each eye presents a broad interrupted zone of pigmented sclera reaching from within a few millimeters of the cornea almost to the equator of the globe. The pigment is blotchy and varies from light to dark slaty gray and in places brownish, probably due to the presence of capillaries, as the instillation of adrenalin causes it to lose the brownish color. The skin of the lids is dusky and the veins dilated and dark. The skin of the face shows linear pigment stripes. There are disseminated areas of "port-wine" nevus over the entire body with the exception of the right arm and foot. The ocular fundus has a dark steel-gray hue. The patient is the oldest of five children. None is similarly affected. She had good teeth and has broken no bones. The condition is a pigmented nevus of the sclerotics.

Uveitis with Disciform Opacities.

Dr. Zentmayer since sending in the title had become convinced that his case was not really one of asteroid hyalitis as he had thought possible at first. The appearance being similar to a dotted veil. There is a patch of exuative retinochoroiditis in the same eye.

Discussion.—Dr. Halloway stated that he agreed with Dr. Zentmayer that the present opacities were those sometimes seen in cases of severe uveitis. Since the publication of his previous report he has seen three cases of these snowball vitreous opacities, the details of which will be published later.

Congenital Ptosis. Motais Operation.

The case was reported to emphasize the value of the Shoemaker modification of Motais's operation. The child was aged five years, and the superior rectus so frail that the difficulties of the procedure would have been unsurmountable had not the open method been used. The result is not perfect but is very good.

Use of Ethylhydrocuprein.

The case presented had been one of severe pneumococcic traumatic ulcer, 7 mm. in diameter, with hypopion. Vision = L. P. The treatment consisted in the use of ethylhydrocuprein, ice compresses and atropin. The result was a corneal scar not as large as the original ulcer and vision = 3/60. Dr. Zentmayer's faith in ethylhydrocuprein strengthens with his experience. Any bactericidal agent to be effective must be, as far as practical, constantly in contact with the organisms. His method of using optochin is to have a 1 per cent solution dropped into the conjunctival cul-de-sac every two hours during the day and every three hours during the night, and to have the ulcer touched with 2 per cent twice daily. A local anesthetic should be used before each application.

Buphthalmos: Results of Posterior Sclerotomies and Optical Iridectomy.

Dr. Luther C. Peter exhibited P. V., aged seventeen months, who was shown at the section about a year ago. Briefly the history at that time was as follows:

The child had a condition of buphthalmos at birth. The corneæ were both very large, blue and the centers of the cornæ were occupied by marked white opacities and granulations. It was pebbly in appearance, with marked juvenile arcus. The anterior chambers were very deep and the iris indistinctly visible thru the cloudy corneæ; pupils dilated to about 4½ mm.; tension of the eyeballs about 35 mm. The scleras are bluish white in color.

Family History.—The parents are Italians, second cousins; one other child, an older brother, is suffering from the same disease and is totally blind, enucleation having been performed on one eye. There are five other healthy children.

Myotics were used the first six months without any apparent improvement. At this time posterior sclerotomy was performed on the right eye without any untoward symptoms and was followed by a marked clearing of the cornea. Subsequently at intervals of two months repeated posterior sclerotomies were performed, four on each eye, followed in each instance by marked clearing of the corneæ, which, however, had a tendency to relapse. By this series of tapping the posterior chamber the tension of the eyes has been kept at about 25 mm. of mercury. Because of the cloudy media the child was developing lateral nystagmus. Optical iridectomies were therefore decided upon and a small section of the iris was removed at the outer limbus in the right eye and the inner limbus in the left eye as the areas in the corneæ offering the best visual results. Very little reaction followed these operations, and the child now is able to see objects fairly small, and the nystagmus has practically disappeared.

The results obtained from this method of treating the patient are satisfactory up to the present time. (1) The corneal opacities were decidedly lessened after each posterior sclerotomy; (2) the tension of the eyeballs was held at about 25 mm. of mercury; (3) the optical iridectomies have decidedly improved central visual acuity and have practically removed the nystagmus which was rapidly developing. The child is kept under observation, and should the tension be increased further, posterior sclerotomies will be performed. One cannot say what the ultimate prognosis will be in this case as the results of the surgical procedures, but the visual results and the general improvement at this time are very satisfactory.

Dr. Zentmayer thought that Dr. Peter was fortunate in the result obtained. From the opinion expressed by many of the ophthalmic surgeons of America it is evident that any operative procedure to be of value must be done early. He recalled that Dr. de Schweinitz had reported successes with posterior sclerotomy, and Dr. Zentmayer believed that, except in the very earliest stage of the disease, this was the only justifiable procedure.

Dr. Holloway stated that in examining this child he had noted that there occurred some reflex sneezing. In his experience this very frequently occurred, and he referred to two children at the Overbrook School for the Blind where this was present to a persistent and excessive degree upon the slightest attempts of the patients to open their eyes. There was intense photophobia in each case. He thought it worth while to comment upon this, not because he regarded it as peculiar to this particular affection, but simply because it is frequently associated with it.

Dr. de Schweinitz stated that his attention had been directed by Haab's recommendation to the value of repeated sclerotomies in the treatment of buphthalmos. He briefly referred to two cases treated by corneoscleral trephining, the operations having been performed not by himself. Certainly in these two cases apparently there was temporary benefit, but he was unable to relate the ultimate outcome of the operations.

Unusual Case of Perivasculitis.

Dr. Luther C. Peter showed Mrs. A. J., colored, aged sixty-one years, housekeeper, who complained that her sight began to fail about three years ago. Her present ocular condition is as follows:

Vision in the right eye is 20/200 and in the left 20/30. Arcus senilis is marked in both eyes; pupils 3 mm. equal in diameter; react to light and accommodation. Eye-grounds: Right eye pupil is oval, long axis, 90 degrees. There are a few fine lenticular opacities and a few floating masses in the vitreous. The disc is 16x18 mm.; long axis, 90 degrees, well defined, excepting at the upper and outer border; edges somewhat obscured. The veins are overfilled and tortuous; arteries are tortuous and light streaks are for the most part absent. The superior temporal branch of the central artery shows a marked perivasculitis. It consists of a broad ribbon-like perivascular tissue thru which a narrow column of blood is visible here and there. About 3 d. d. from the disk the vessel and its branches disappear in a retinal haze, but appear beyond in bifurcations, which are surrounded by narrow borders of white. The terminal branches are exceedingly narrow and tortuous and the macula branch, which is derived from the superior temporal artery, is also a solid mass of white tissue and is lost in a hazy macula area. This temporal vessel, including the macular twig, is at least twice the size of the other branches of the central artery in the neighborhood of the disc. Surrounding the macula is a beginning stellate figure which is regarded as diagnostic of the so-called "albuminuric retinitis." Beneath the macula are a few minute round hemorrhages. Other parts of the fundus show moderate retinal haze and edema and evidences of arteriosclerosis. There are no hemorrhages. The perivasculitis is distinctly confined to the superior temporal branch.

The left fundus is similar in appearance to that of the nasal half of the right retina, characteristic of the fundus usually found in chronic interstitial nephritis.

The fields in each eye show the characteristic contraction for form and color. In addition to this concentric contraction there is a quadrant area of blindness down and in. This quadrant is almost lost for form and totally lost for red, and in a small area to the nasal side of the field the green test object is recognized as white.

The patient shows a generalized arteriosclerosis. The urine is of low specific gravity and contains an occasional cast and albumin. The blood Wassermann is negative. The clinical medical diagnosis is that of chronic interstitial nephritis, with marked cardiovascular changes.

The case is of unusual interest both because of the imitation of the perivasculitis, the superior temporal branch of the right eye, and also because of its very pronounced appearance and the abundance of the perivascular tissue. As to the immediate etiologic factor, embolic or thrombotic processes can be safely eliminated. The condition undoubtedly is a perivascular change, arteriosclerotic in origin and associated with chronic interstitial nephritis.

Dr. de Schweinitz agreed with Dr. Peter that the vascular changes in his patient were not the result of an embolic process, and thought they represented lesions in association with arteriosclerosis and nephritis. He assumed that the influence of syphilis had been eliminated. He described a case of extensive retinal vasculitis and perivasculitis in a colored man which he had reported, and which was almost certainly due to syphilis, and referred to the fact that it had seemed to him that such vascular changes were apt to be more pronounced in the colored than in the white race.

Sudden Loss of Vision from Acute Sphenoiditis, Recovery.

Dr. H. Maxwell Langdon presented the history of this case because of the three cases reported by Dr. D. T. Vail in the AMERICAN JOURNAL OF OPHTHALMOLOGY for February, under the title, "Monocular Retrobulbar Optic Neuritis from Hyperplasia of the Ethmoid Bone." Dr. Langdon's case was very similar to them except that the sphenoidal sinus was involved instead of the ethmoid. Mrs. M. B. W. was first seen on January 23, 1917, with the following history: She had had grip, with much pain around the right eye and brow for the preceding ten days. O. D. vision blurred the past two days.

Externally the right pupil was 4 mm.; no reaction to direct light, but a good consensual response. The left pupil was 2.5 mm.; good direct reaction; no consensual reaction. Each acted well to accommodation. The ocular rotations were full in all directions. O. D. vision. Fingers at one foot. O. S. vision 6/10. The media were clear; the right disc somewhat hyperemic with blurred nasal margins; the left disc was normal; there were no other fundus changes. The right field was gone except for an irregular light field, and the left field was normal except for a slight contraction for colors.

Dr. G. B. Wood examined the nose and found no evidence of sinus involvement except some slight congestion of the right middle turbinate; an X-ray investigation made by Dr. H. K. Pancoast was negative except for some clouding of the left antrum.

Later, Dr. Wood again examined the nose, and after applying cocain to the right ostium sphenoidale there was a sudden improvement in vision, the patient seeing the pattern on the floor covering. Dr. Wood then removed the posterior end of the right middle turbinate and drilled a small hole thru the front wall of the sphenoidal sinus without finding any pathologic secretion. The vision improved with washing of the sphenoid, until on the tenth day after the first operation the vision was 6/15, and with no treatment other than nasal. The disc hyperemia disappeared and there were no further complications, corrected vision being 6/5.

That this was an involvement of the optic nerve from a sphenoidal sinuitis seems beyond all doubt, and yet there was no pathologic secretion on tapping the sinus and no shadow on an X-ray plate from a cloudy content of the sinus. It seems there must be a form of involvement which gives a clear secretion, at least in the early stages, for this case was attacked as soon as the vision was disturbed. It opens up an interesting point as to whether Dr. Vail did not have something of the kind involving the sphenoid rather than hyperplasia of the ethmoid bone.

Dr. de Schweinitz briefly discussed a case of acute retrobulbar neuritis which had been examined and described by Dr. W. R. Parker, where there had been sudden improvement in vision after the free use of adrenalin in the nasal chambers, which had apparently started drainage and thus relieved pressure on the optic nerve. He questioned whether negative X-ray examinations and investigation of the nasal chamber in the sense of failure to find purulent secretion were sufficient to exclude the presence of some types of ethmoiditis which might be the cause of optic nerve changes. He referred to the fact that unilateral intraocular as well as retrobulbar neuritis were strongly suggestive of sphenoidal or ethmoidal infection.

Hypopyon Ulcer of Cornea Treated by Chauffage.

Dr. H. Maxwell Langdon related the case of W. M., who was first seen February 2, 1919, with the history that on February 22, while digging a street excavation, a piece of asphalt struck him in the right eye, since which time the eye had been sore. The eye was slightly injected, and there was a corneal ulcer, about 3 mm. in diameter, slightly to the upper, outer side of the pupil. The ulcer was touched with carbolic and a bandage was applied, the pupil dilating readily with atropin. The ulcer spread slightly, but was checked by further carbolization, tho the center would not heal and there was steady increase of the hypopyon until the lower half of the anterior chamber was filled, and it was determined to try the effect of radiant heat. A galvanic cautery was heated until a thermometer held over it registered 145° F., and when held below the cautery registered 125°; as the eye was below the instrument, this is the temperature applied, the eye having been thoroly cocainized. It was held as close to the eye as possible, avoiding contact, for a minute, then away for three minutes, during which time the eye was irrigated with salt solution; the application was repeated twice at the same sitting. In twenty-four hours the hypopyon was beginning to absorb, the iris at the lower outer portion of the anterior chamber becoming visible. The improvement was uninterrupted until the hypopyon is now entirely absorbed and nothing remains but a moderately dense scar near the center of the cornea, due probably as much to the repeated use of carbolic acid as to the heat. Had the heat been used sooner it seems most likely that the scar would have been much less.

This heat was applied, of course, after the method described by Weekers, and not in the way Shahan advises, one of his thermophors not being available.

Dr. de Schweinitz, altho he had had no personal experience with Dr. Shahan's thermophor in ophthalmic practice, referred to reports he had received of its value in the treatment of infected corneal ulcers in the service of U. S. General Army Hospital No. 14, at the time of the report in charge of Dr. Meyer Wiener.

Dr. Holloway stated that he regarded Dr. Langdon's result with chauffage as excellent, but he felt that it was worth while emphasizing the important work which had been done in this country by Shahan in placing the application of heat to the eye upon a somewhat more scientific basis. Unfortunately, Shahan's instrument was not available at the present time, and until this could be secured it would be necessary to use some of the other methods, which while they doubtless give satisfactory results are by no means as accurate in determining the actual degree of heat applied.

J. Milton Griscom, M. D.,
Clerk.

American Journal of Ophthalmology

Series 3, Vol. 2, No. 9 September, 1919

PUBLISHED MONTHLY BY THE OPHTHALMIC PUBLISHING COMPANY

EDITORIAL STAFF

ADOLF ALT,
Metropolitan Bldg., St. Louis, Mo.
M. URIBE-TRONCOSO,
143 W. 92nd St., New York City.
MEYER WIENER,
Carleton Bldg., St. Louis, Mo.
CASEY A. WOOD,
7 W. Madison St., Chicago, Ill.
HARRY V. WÜRDEMANN,
Cobb Bldg., Seattle, Washington.
EDWARD JACKSON, *Editor,*
318 Majestic Bldg., Denver, Colo.
CLARENCE LOEB, *Associate Editor,*
25 E. Washington St., Chicago, Ill.

Original papers and books for review may be sent to any member of the editorial staff. Reports of society proceedings, correspondence, and other scientific communications should be addressed to the Editor.

Proof should be corrected and returned within forty-eight hours to the printer. Reprints may be obtained from the printers, Tucker-Kenworthy Co., 501 S. La Salle St., Chicago, Ill., if ordered at the time proofs are returned.

Subscriptions, applications for single copies, communications with reference to advertising or other business, should be addressed to
H. A. FOX, Manager, 7 West Madison St., Chicago, Ill.

THE BELGIAN SOCIETY OF OPHTHALMOLOGY.

After more than five years intermission necessitated by enemy occupation, the Belgian Society of Ophthalmology held its reopening meeting on the 29th of June, 1919, with Professor J. Coppez as president.

In his address of welcome Professor Van Duyse, the general secretary, paid tribute to the members of the society, who on the one hand, devoted themselves to the cause of law and justice in the army, and on the other, rendered signal services in the occupied territory.

The following resolutions of the officers of the society were adopted:

"The bureau of the Belgian Society of Ophthalmology, reunited in the meeting of June, 1919, at Brussels, takes cognizance of the facts disclosed by a letter of the Academy of Science of Belgium, of the 20th of January, 1919, and by various documents, which give evidence that the German scientific and university world approved the deeds of the Central Powers, against us and against our allies. These deeds, contrary to all civilized usage, became familiar to the population of occupied territory during the world war, and they remain an ineffaceable stain upon conquered Germany.

Therefore the bureau of the Belgian Society of Ophthalmology engages that its members:

1. Withdraw from German and Austrian scientific societies and give up all collaboration with Germans and Austrians.

2. Exchange no publications and have no intercourse with the Central Powers.

3. Renew scientific intercourse with the enemy only when they prove by public declaration that they condemn the mentality of those who signed the manifesto of October, 1914."

Correlative to this order of the day, the assembly announced the removal of the names of German and Austrian honorary members and correspondents from its lists.

Professor Coppez received congratulations upon the completion of fifty years of professional service. The secretary recalled to the society that Professor Coppez was the founder of the science of ophthalmology and its teaching in Belgium. Moved by the demonstration, Professor Coppez replied that it was to the French masters of the science, past and present, that such recognition was due.

M. DANIS.

THE ETIOLOGY OF MYOPIA.

The relation of the sclera to the skeleton, which is mentioned in the paper by Ochi is suggestive of thought, and a subject for investigation that may have very practical results in improving the management of myopia. The bony skeleton is, of course, but a part of the general connective tissue frame work, which supports all parts of the body. The peculiarities of structure and the deposit of lime salts that characterize bone, easily arise in parts of this connective tissue framework that usually remain soft, as in anomalous sesamoid bones, or the "pully" of the superior oblique muscle.

The congenital anomaly manifest in "blue scleras and brittle bones," which association has occupied an important place in the recent literature of ophthalmology, seems to be an illustration of the close relation between the sclera and the bony skeleton as to essential conditions of nutrition. Other evidence of such a relation is worth looking for, and is likely to prove equally suggestive.

It is some 27 years since R. D. Batten suggested the hypothesis that the occurrence and development of progressive myopia depend on a nutritive defect in the sclera, which he associated with constitutional and especially cardio-vascular disease. The association is still worth considering.

Subsequently Batten wrote on the association of myopia with nasal disease. Risley has reported many cases illustrating the connection of myopia following ocular congestion produced by eyestrain, especially by the strain incident to eye work with uncorrected astigmia. There are extensive statistics connecting myopia with use of the eyes for near work.

The theory ascribing myopia to a peculiar form of the orbit by which oblique muscles, especially the superior, were made to exert especial compression on the eyeball; the compression of the posterior ciliary vessels in convergence; or of vortex veins by the inferior oblique muscle; the defective closure of the scleral fissure, the overdevelopment of the human cranium and consequent modification of the orbit have all been invoked as the predisposing causes of myopia.

There has been too much theoretic argument, and not enough careful, exact observation regarding this subject. The statistics need more careful sifting. The different hypotheses need the consideration of unbiased judges, not further exploitation by special pleaders.

The development of myopia needs to be considered broadly. Evidently it depends on a disturbed balance of nutritive forces. Every factor that bears upon those forces may be important in destroying their balance. All are worthy of consideration, and must be considered judicially before the true share of influence can be ascribed to any one of them.

If a school girl develops myopia, has she astigmia? Is she converging excessively? Is there a sclero-choroiditis present? Has she vascular or nasal disease? Is there evidence of defective nutrition in other directions, particularly of skeletal and connective tissue structures? When we can answer all these questions, we may be able to assign to each factor its proper share in the result. Meanwhile we must devote attention to all those remedial conditions that seem likely to be important factors in producing elongation of the eyeball.

E. J.

TO AVOID PROFESSIONAL RUTS.

Specialization, repetition, and habit make for accuracy, rapidity, and easy accomplishment. But they also have dangers in the way of narrowness, fixed routine, and unfitness to deal with new situations and overcome new difficulties.

The specialist has more need than his less differentiated colleague to keep a broad interest in the general field of medicine, and to have his everyday problems presented from new points of view.

Every practitioner of medicine needs to leave his daily round at times to see how others do their work, to learn that his own familiar problems can be approached from a different angle, and dealt with by different methods. To the specialist such escape from his daily routine is absolutely necessary, if he is to continue an intelligent, rational, up-to-date, practitioner of his specialty.

No matter how highly we may specialize, there remains some variety in our work. To the ophthalmologist, the many contacts of ophthalmology with general medicine and surgery are precious opportunities to get away from routine in our examinations; and to approach questions of disease from a more general point of view. Reading is another channel in which to get someone else's line of thought, even on the most common conditions we have to treat; and it is well thus to get into other branches of medicine, and consider their more important problems in pathology; while we welcome every opportunity to consider the most common diseases with which we have to deal from a new standpoint.

Another war may never bring the problems of alien labor companies. But Dr. Derby's account of how trachoma was dealt with among them under military emergencies contains valuable suggestions at to how men may be inspected, and watched in mines, large manufacturing plants, or construction works. The experience that made zinc sulphat solution the "universal drops" in that service, gives a hint of what may be possible in trachoma infested communities.

No reader of this JOURNAL may ever be called upon to organize an ophthalmic service for expeditionary forces; but the plan for the eye clinic, the list of equipment required, the experience of the relative importance of refraction work in a modern army, the essentials of diagnosis and treatment brought out and emphasized in the army circulars given last month, may be more helpful than a repetition of the requirements, and teaching in the offices or clinics we have actually worked in.

The accounts given by Duane and Howard of the exact visual requirements for the signalman, and the aviator should stimulate thought and prove suggestive as to the strains put upon the eyes of our patients, the needlewoman, the bookkeeper, the mechanic or the miner. It is the same organ that is required to give service in all these different directions. Each use of it has its own peculiar form of stress and danger, but all we can learn about it under one set of conditions is of possible value in helping to understand its dangers under other conditions.

Even the reading of crude and obviously injudicious methods of treatment, or poorly planned or unnecessary methods of operating, can help the thoughtful ophthalmologist to get a better appreciation of his own therapeutic methods and operative resources. Wherever we can find an intelligent, honest report of what has occurred in an eye placed under unusual conditions, it is worth reading and thinking about. The exigencies of war have presented familiar problems in a new light to those who entered military service; and thru their reports of their experience, to ophthalmologists everywhere. Our war literature will soon pass or cease to be current. Let us get the most out of it that we can while it lasts. It may take some thought to apply its lessons to our ordinary problems, but that kind of thinking is always a good exercise.

It is the aim of this JOURNAL to draw

its contents from the widest possible sources. On this account we welcome contributions from all parts of the world, from the laboratory worker or the physicist as well as from the master of the large ophthalmic clinic. Especially welcome is really good work on the part of a new writer. Each individual approaches our common questions and difficulties in a slightly different way that is more likely to be helpful than the repeated statements of an old teacher or a familiar writer.

The most efficient, resourceful, successful ophthalmologist will be he who keeps from forming ruts in his thinking and methods of practice, in which he would travel along contentedly until he lost the power of turning his thought in new directions. We therefore urge our readers to utilize the war papers now being published, and discussions, particularly those of the American Ophthalmological Society, to get this view of eyes and their shortcomings different from the one forced on our attention by our daily routine of practice.

E. J.

CORRESPONDENCE.

Trachoma on the Pacific Coast.

To the Editor:

Referring to an article under the above title in the June number of the AMERICAN JOURNAL OF OPHTHALMOLOGY, by H. V. W., I beg leave to amend the title by having it read, "The Relative Scarcity of Trachoma on the Pacific Coast *at the Present Time;*" also to call attention to the fact that thirty years ago conditions in the northwest were quite different from what is found at the present time; then there was no dearth of trachoma.

The Puyallup, Nisqually and other tribes of Indians were badly infected. Twenty-five years ago the Reservation School near Tacoma, now the Cushman Indian School, having as it does, children and youths from many tribes, even as far east as Montana, had a severe epidemic of trachoma. Dr. P. B. Swearingen, then resident physician, called the writer to his assistance to treat the cases and arrest the epidemic. We fought the disease for several years and very nearly stamped it out, both in the school and among the members of the Puyallup tribe. The number afflicted ran into the hundreds.

Thirty years ago trachoma was also prevalent among the white population of Tacoma and Puget Sound; many Swedes and Norwegians came from the Middle West and settled in the city and surrounding country. A large number of these people brought the disease with them and transmitted it to their children and grandchildren. The public school children of other families contracted the disease, and from 1890 up to 1910, there was a great deal of it. But after the rush of immigration was over those affected came under treatment, precautions were taken in the schools, common towels done away with in shops, lodging houses and homes, where there were sore eyes, and there began to be a falling off in the frequency of its occurrence. During the last ten years of my practice in Tacoma, it became rather an uncommon disease. Whether the climate had any influence over its control is a question.

East of the mountains the disease was never prevalent either among the Indians or white people, as it was formerly on Puget Sound. At the same time there has been among the Indians of Yakima less opportunity for proper care and treatment, owing to the distance from medical aid, and to a less degree of civilization. There is more dust and dirt and flies, but the Indians live in the tepee and open as much if not more than those of the coast country. I know little of the conditions east of the Rockies except such as I gained from children in the Cushman School, who came from Montana. I found none afflicted with trachoma.

Personally I am of the opinion that better treatment and care until complete recovery was assured, better sanitary conditions, better knowledge of the disease among the laity, have had more to do with its control in all walks of life, and among all nationalities in the Northwest, than climate. The disease has gradually diminished during the last thirty years, as a result of care, sanitation and proper treatment.

Perhaps if H. V. W. returned to Milwaukee he would find the same results there, and not the conditions of thirty years ago.

P. B. WING.

San Diego, Cal.

An Improved System of Illumination for the Electric Ophthalmoscope.

To the Editor:

Under the above title the writer of this letter read a short paper at the Fifty-fourth Annual Meeting of the American Ophthalmological Society held at New London, 1918. He described the system, which had been constructed under his guidance by the well-known inventor of electrical and optical instruments, Mr. R. H. Wappler; he developed its theory and explained its advantages. In the discussion Dr. Walter E. Lambert asked him how this system of illumination differed from "Dr. May's Ophthalmoscope," to which he replied that the answer was easy. There was no difference whatever. This illuminating system had been "incorporated" into the "May Ophthalmoscope," without his knowledge and consent, and had gone forth into the world as the "May Ophthalmoscope."—For surely the essential part of an ophthalmoscope is the illumination, and not the disc or other nonessential parts.

In the May number of the AMERICAN JOURNAL OF OPHTHALMOLOGY appeared a lengthy letter by Dr. May, in which he denies the truth of my statement, and says: "I wish emphatically to state that I owe nothing to either Dr. Koller or to Mr. R. H. Wappler in connection with this instrument."

The following statement by Mr. R. H. Wappler, senior member and President of the Wappler Electric Company, the very concern which manufactures and sells "Dr. May's Electric Ophthalmoscope," will suffice to clear the fog and end this controversy.

New York, June 4, 1918.

I certify that Dr. Koller and myself have collaborated between 1910 and 1912 on the construction of an illuminating system for an electric ophthalmoscope, and that with his help and under his guidance I have constructed the system, which has been incorporated in the "May Ophthalmoscope," manufactured and sold by the Wappler Electric Company.

Signed. R. H. WAPPLER.

Witness: C. JOHNSON.

This clear and unequivocal statement leaves no room for any controversy, and shows that the essential part of "May's Electric Ophthalmoscope"—the illuminating and reflecting system—is not Dr. May's work.

CARL KOLLER.

New York, June, 1919.

(In medical literature priority of publication is the only priority that can be recognized. In closing this discussion it may be timely to remark that discussions as to the priority are always unsatisfactory and generally unprofitable.—Ed.)

BIOGRAPHIC SKETCHES.

THOMAS H. SHASTID,

SUPERIOR, WISCONSIN.

WILLIAM KNISELY CHERRYHOLMES. This well-known ophthalmologist of Hamilton, Ohio, died on March 31, 1919, of influenza. He was born at Millersburg, Ohio, in 1861, received the A. B. at the Ohio State University in 1882, and the M. D. at the Bellevue Hospital Medical College in 1884. For a time he practiced general medicine in partnership with his brother-in-law, Dr. Wise, at Millersburg. Later, he was special examiner in the Pension Bureau at Washington, D. C. He settled in Hamilton in 1892, specializing in ophthalmology and oto-laryngology, where he practiced until his death.

MORTIMER FRANK. This well-known ophthalmologist and medical historian died at his home in Chicago on April 21, 1919. He was born at Buffalo, N. Y., May 26, 1874, received the B. S. at the Boston Institute of Technology, and the M. D. at the University of Illinois in 1901. Having practiced general medicine in Chicago for a year, he studied ophthalmology in Philadelphia, New York, Paris and Vienna.

Returning, he settled as ophthalmologist in Chicago. He was a Fellow of the American Academy of Ophthalmology and Oto-Laryngology, ophthalmologist to the Michael Reese and other hospitals, secretary of The Chicago Society of Medical History, and editor of the same society's "Bulletin." In medical history the Doctor was, in fact, an enthusiast, and his library of old and rare medical books and engravings numbered several thousand items.

Mortimer Frank, 1874-1919.

Among the more important writings of Dr. Frank we may mention "John Taylor and Sir William Read" (1905); "The Resurrectionists" (1907); "Philip Syng Physick" (1914); "Caricature in Medicine" (1911); "Biographical Sketch of Some Representative Ophthalmic Surgeons" (in Wood's "A System of Ophthalmic Operations," 1911, I, p. 17); "Medicine in English Literature Before the Eighteenth Century" (1912); "Medical Instruction in the Seventeenth Century" (1915); "Discovery of the Secretory Glands" (1916), and an English translation of Choulant's "History of Anatomical Illustration" (forthcoming). Concerning the last named work, Dr. F. H. Garrison, of Washington, D. C., in a letter to "The Journal of the American Medical Association," May 24, 1919, p. 1562, says: "Dr. Frank's interest in the subject of medical illustration led him to undertake, in 1916, the translation of Choulant's 'History of Anatomical Illustration.' This book, published in 1852, is one of the classics of medical literature, a work of unsurpassed thoroness, a sort of *Gradus ad Parnassum* for those who would essay the difficult heights which Choulant has scaled, for the earlier history of anatomy, from Leonardo to the time of Bichat, is mainly in the manuscript illustrations and the illustrated text. In our days of distracting and dividing interests, no man could hope to know the approaches to anatomy in the older writings who had not mastered at least the essentials of this book. Few of us would have cared or dared to attempt such a translation. Choulant is a work of the highest scientific merit, but, in the original German it is not a readable book. Its author wrote in the time of Hegel, his bent was philosophic, his sentences of the sesquipedalian order, like the 'long rollers' in Gibbon or Swinburne, or the prosy periods voiced from the pulpit in the Georgian period. Dr. Frank cleverly overcame the almost insurmountable difficulties of rendition by bisecting the long Choulantian sentences or dissecting out their meaning, so that his translation now stands, in clean-cut intelligible English, as something viable and readable for modern students. To the original work, long since out of print, the translator added completed biographies and an exhaustive *compte rendu* of accumulated research work since the time of Choulant, a man-sized performance in itself. With new illustrations, this modernized Choulant, now in the hands of publishers, may be, in course of time, a *vade mecum* for the professor of anatomy, the medical librarian and the art school."

Dr. Frank was a tall, lean man, smooth faced, of fair complexion and with light brown hair and blue eyes. He was quiet and deliberate in manner as a rule, but cordial to his friends and a "romp" among children. Nothing delighted him more than to exhibit his medico-historical library to those who loved such things, and the writer recalls with pleasure an all-too-short forenoon spent with Dr. Frank in his magnificent treasury of rare volumes. The Doctor was very public spirited, a Director of the Chicago Public Library, a liberal in politics, a member of the Jewish Reformed Church. He married on Oct. 4, 1905, Donie K. Frank, by whom he had two children—Katharine Jane and Mary Elizabeth.

We cannot do better than close with words of Dr. Garrison: "Dr. Frank was a sportsman and a gentleman, a thoroughly likable and lovable man, a very faithful and loyal friend. To those who knew him well it will always seem triste and unthinkable that he should have been cut down in his prime, just before the appearance of the book to which he had devoted so much of praiseworthy competence and such ardors of patient research."

SAYER HASBROUCK. A well-known homeopathic ophthalmologist and otolaryngologist. Born at Middletown, N. Y., June 3, 1860. He was a son of John W. Hasbrouck, a well-known journalist, and Lydia Hasbrouck, daughter of Benjamin Sayer, of Warwick, N. Y. Dr. Hasbrouck in 1875 entered Cook Academy, at Havana, N. Y., where he graduated in 1879. In the fall of that year he entered the Boston University School of Medicine, graduating in 1882.

For a time Dr. Hasbrouck was physician to the New York Homeopathic Insane Asylum at Middletown. Then he went to Dublin, Ireland, and entered the Rotunda Hospital, at the same time studying the eye, ear, nose and throat at St. Mark's Ophthalmic Hospital. Receiving the degree of L. M., he was for a short time house surgeon at St. Mark's. After this he studied the eye, ear, nose and throat at Belfast, Glasgow, Edinburgh and London. At the Royal London Ophthalmic Hospital (Moorfields) he was assistant to Sir George Lawson, and at Gray's Inn Throat and Ear Hospital, to Dr. Hamilton.

After a little study on the Continent he returned to America in 1884 and settled at Providence, R. I., as ophthalmologist and otolaryngologist. He was soon widely known in homeopathic circles.

Dr. Hasbrouck married, on September 25, 1889, Mary Owen Fiske, daughter of John T. Fiske, of Chepachet. She died on February 14, 1906, leaving a daughter, Miss Fannie Fiske Hasbrouck, who now lives in New York City. Dr. Hasbrouck later re-married, but the name of his second wife could not be learned by the present biographer.

Several years ago, Dr. Hasbrouck's health began to fail, and he removed to Hamilton, Bermuda. There he resided until his death, which occurred on March 24, 1919.

NEWTON C. STEELE, professor of diseases of the eye, ear, nose and throat in the Chattanooga Medical College, died at his home, March 9, 1919, from pneumonia. Born at Athens, Ala., in 1850, he received the medical degree at the University of Nashville, Nashville, Tenn., in 1873. For a time he practiced at Corinth, Miss., but soon removed to Chattanooga. Here he practiced as ophthalmologist and otolaryngologist until his death—a period of more than thirty years. His only son, Dr. Willard Steele, was a partner with him for the last few years of his practice. Dr. Newton C. Steele is survived by a wife and two children, Dr. Willard Steele and Mrs. W. D. Carswell.

FRANK VAN FLEET. The world of ophthalmology was shocked to learn of the death of this distinguished ophthalmologist, who was found dead in his office at 17 East Thirty-eighth street, New York City, on April 5, 1919. Born in New York City on March 31, 1860, son of Henry S. and

Esther Flandreau Van Fleet, he received his medical degree at the Bellevue Hospital Medical College of New York City, in 1881. Settling in New York as ophthalmologist, he soon had an extensive practice and a wide reputation.

Frank Van Fleet, 1860-1919.

He was executive surgeon to the Manhattan Eye, Ear and Throat Hospital for seventeen years, and at the time of his death was president of the Board of Surgeons of the same institution. He was a Fellow of the New York Academy of Medicine and of the American College of Surgeons, and was once President of the New York County Medical Society. He was also Treasurer of the New York State Medical Society and chairman of the legislative committee of that body for very many years. During the war he gave much time to the examination and treatment of soldiers whose eyes had been injured by poisonous gases. He wrote so many articles that they cannot here be listed.

Dr. Van Fleet was rather a stout man, 5 feet 6 inches high, of a fair complexion and with blue eyes and blonde hair. As a rule he wore a mustache. He was very quiet, but courteous and friendly. He was a Republican, a member of the Methodist Episcopal church, a hard student of the Bible, a very devout Christian.

The Doctor married in 1883 Carrie Blair Oakley, by whom he had three children — Harry, Raymond Oakley and James Flandreau. The latter is now a lieutenant in the Medical Corps of the Navy.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C. Volunteers are needed in other localities.

DEATHS.

Andy Jackson Stewart, aged 46, a resident of Provo, Utah, died at his home, from pneumonia, on May 25.

Lord Reyleigh, scientist, of Essex, England, died June 30, aged 76 years.

PERSONALS.

Col. J. Herbert Parsons, London, has received the C. B. E..

J. Meller has succeeded S. Bernheimer in the Vienna Eye Clinic.

G. E. Burroughs has been appointed ophthalmic surgeon to the Liverpool Royal Infirmary.

Col. W. T. Lister has been appointed surgeon-oculist to the H. M. Household, and has received the K. C. M. G.

Dr. H. D. Lamb, St. Louis, passed thru Denver on his way home, after spending his vacation in the mountains.

Dr. Adolph Barkan has returned to San Francisco after an absence of eight years spent in Germany and Switzerland.

Dr. Francis Lane, of Chicago, who has been suffering from an attack of appendicitis, will go to Flagstaff, Arizona, for a month's vacation before resuming his practice.

Col. Walter B. Lancaster, of Boston, was in Denver a few days ago en route to California. It is always a pleasure to meet Dr. Lancaster anywhere, but especially in our "own home town."

Dr. José Joaquin has recently published a study of the prevalence of blindness and its distribution and causes in Mexico, which does credit to his ability to ferret out such matters.

MILITARY NOTES.

Dr. George E. Bellows has returned to civil practice, and is located at 1010 Rialto building, Kansas City, Missouri.

Capt. W. T. Brinton has just returned from overseas service to resume his practice at Cripple Creek, Colorado.

Dr. George S. Crampton, Lieut.-Col., M. C., U. S., Army, after fourteen months' service with the 28th Division overseas, has returned to his home in Philadelphia.

Capt. Frederick T. Clark, of Westfield, Massachusetts, who since last March has been chief of the ophthalmologic service at U. S. Army General Hospital No. 1, New York City, has been promoted to major and made chief of the combined ophthalmologic and oto-laryngologic services.

Major William Humes Roberts, who went to France as chief of the eye and ear service of Base Hospital 93, has been discharged from service and has reopened his offices at 461 East Colorado street, Pasadena, California. During the latter months of his stay in France, Dr. Roberts was eye consultant of the Justice Hospital Group in Toul.

SOCIETIES.

The American Academy of Ophthalmology and Oto-Laryngology will meet at Cleveland, Ohio, October 16, 17 and 18.

The Sioux Valley Eye and Ear Academy met in Omaha July 22, 1919, at the Hotel Fontenelle. This society is composed of members from Iowa, Nebraska and South Dakota. They had a short, snappy program and the meeting was well attended.

At the completion of the summer course on ophthalmology, held in Denver August 4 and 5, under the auspices of the Medical Department of the University of Colorado, the Colorado Congress of Ophthalmology held its annual meeting. This year the oto-laryngologists participated in the program and contributed largely to the success of the meeting. Dr. Arnold Knapp of New York was present as the guest of honor. The last evening was devoted to a mountain auto trip and dinner at the Mountain Home of the Automobile Club.

Indiana Academy of Ophthalmology and Oto-Laryngology held its regular semi-annual meeting May 28 and 29, at Indianapolis. Officers elected: President, W. S. Tomlin, Indianapolis; vice-president, F. G. Hackelman, Rushville; second vice-president, Fred McK. Ruby, Union City; secretary-treasurer, B. J. Larkin, Indianapolis; councilors—for three years, E. J. Lent, South Bend, and J. W. Hadley, Frankfort; for one year, T. C. Hood, Indianapolis, and G. H. Smith, Newcastle. Six papers were listed on the program. The morning of the second day clinics were held at St. Vincent's Hospital. Thirty-two were present. Next meeting will be at South Bend.

The seventh annual meeting of the Pacific Coast Oto-Ophthalmological Society was held in San Francisco August 4, 5, 6.

The scientific program was carried out each afternoon in the assembly room of the San

Francisco County Medical Society in the Medical building. Dr. Cullen F. Welty, president of the society, presided at all the sessions. The mornings were devoted to operations and clinical demonstrations by the local men in the leading hospitals of the city.

Dr. W. L. Clark of Philadelphia, who was expected to give demonstrations of his high-frequency treatment of malignant growths, was unable to be present.

The papers presented during the session were unusually good and afforded keen discussion generally.

The visitors were well entertained by luncheons daily at the leading places in San Francisco. A reception was given by Dr. Welty, the president, at his home on Monday evening, and a dinner dance was given at the Fairmont Hotel on Tuesday evening by the Eye, Ear, Nose and Throat Section of the County Medical Society. A matinee party was given for the ladies at one of the leading theaters on Wednesday afternoon, which was followed by an automobile trip to the San Francisco Golf and Country Club, where the members and their wives had tea.

The 1920 meeting will be held in Portland, Oregon, and will be presided over by the new president, Dr. Wilson Johnston, with Dr. Frank B. Kistner as secretary-treasurer.

The society voted a sum of $250 to be put aside yearly towards the expenses of some man of international reputation who will appear before the society and give demonstrations, operative or otherwise.

The tenth annual meeting of the Oxford Ophthalmological Congress was held on July 10 and 11 last, in beautiful weather. Members were lodged in Keble College and the scientific proceedings took place in the Department of Human Anatomy of the University (kindly lent for the purpose by Professor Arthur Thomson), where technical and commercial museums were also arranged.

The program was opened on July 10 by an address of welcome by the master, Mr. Sydney Stephenson. Major Walter H. Kiep, R. A. M. C., read a paper on the "Ocular Complications of Dysentery," which was followed by a good discussion on the subject. Major Edgar H. Smith, R. A. M. C., read a communication dealing with "Quinin Amaurosis," well discussed by the members present. Dr. William McLean, of New York, described his further experimental studies in intraocular pressure and tonometry, and exhibited his latest model tonometer.

Preventive ophthalmology was introduced by Col. J. Herbert Parsons, C. B. E., consulting ophthalmic surgeon to the forces. Colonel Parsons pointed out that the scope of his subject dealt with the prevention of damage (a) to the individual, and (b) to others. (a) Included many subjects, such as prevention of damage to the eyes from accidents, defective illumination, deleterious rays and organisms, and the prevention of damage to health from headache, accident, fatigue, etc.; (b) included regulations for the prevention of the transference of contagious disease and rules for navy, army, air force, mercantile marine, railway, motor industry, cinemas, and so forth. The problems of preventive ophthalmology constituted a question of collective action, and were of particular value at the moment, when projects of reconstruction were to the fore. In connection with the prevention of accidents to the eyes in factories there is urgent need for a scale of awards for compensation founded upon scientific principles. The formulation of regulations for the public services demanded (1) a widening of the basis of education of ophthalmologists; (2) cooperation between ophthalmologists and other experts; and (3) improvement in the methods of examination of candidates and the selection of examiners.

After the discussion, the Doyne Memorial medal was presented to Colonel Parsons by the deputy master, Mr. Philip H. Adams. In the afternoon members and their friends were entertained at tea in the gardens of Trinity College by Mr. D. N. Nagel, M. A., and Miss Nagel. In the evening the annual dinner of the congress was held in the hall of Keble College, some seventy members and visitors being present. The toast list was commendably brief.

After dinner the annual general meeting of the congress was held in the junior common room at Keble College. Among other things, it was determined, on the motion of Mr. J. B. Story, to make representations to the General Medical Council in support of those recently referred to that body by the Council of British Ophthalmologists concerning the instruction and examination of medical students in eye work. Readers of the LANCET are aware that the recommendations in question have been rejected by the General Medical Council.

On July 11 the proceedings began with a paper by Dr. S. Lewis Zeigler of Philadelphia, on the "Problem of the Artificial Pupil; Knife Needle versus Scissors." Dr. P. Bailliart of Paris followed with a communication dealing with his dynamometer for determining the blood pressure in the branches of the central retinal artery. Mr. A. F. MacCallan (Cairo) read a paper on the "Seasonable Variations of Acute Conjunctivitis in Egypt." Col. A. H. Tubby entered a suggestive plea for investigation as to any possible connection between skeletal assymetry, on the one hand, and defects of the eye on the other.

A discussion upon employment for the blind was introduced by three blind speakers, namely, Mrs. Adolphus Duncombe, Capt. Peirson Webber and Captain Towse, V. C., and it is to be hoped that useful action will be undertaken by the congress in connection therewith.

In the afternoon the Ashhurst War Hospital at Littlemore, near Oxford, was thrown open to members by Lieut.-Col. T. S. Good, R. A. M. C.

OPHTHALMIC LITERATURE

These lists contain the titles of all papers bearing on Ophthalmology received within the preceeding month. These titles are all in English, some of them modified to indicate more clearly their subjects. These subjects are grouped under appropriate heads, the succession of groups being the same from month to month. In the group the papers are arranged alphabetically usually by the name of the author in heavy-face type. After the subject of the paper (Ill.) indicates the number of illustrations. (Pl.) the number of plates, and (Col. pl.) colored plates illustrating the article. (Abst.) shows that it is an abstract of the original article. (Bibl.) tells that the paper is accompanied by an important bibliography. (Dis.) means that a discussion of the subject is published with it. Under Repeated Titles are indicated additional publication of papers already noticed. To secure the earliest possible notice writers may send copies of their papers, or reprints, to 318 Majestic Bldg., Denver, Colorado.

DIAGNOSIS.

Hertel. Military Tests of Eye Changes. Strassburg med. Zeit., 1917, v. 3, Abst., Centralb. f. prakt. Augenh., 1919, v. 43, p. 21.

Elschnig, A. Position of the Source of Light in Primary Localization of Cataract. Medizin. Klin., 1917, No. 19. Centralb. f. prakt. Augenh., 1919, v. 43, p. 25.

Polliot. Stereoscopic Test. Ann. d'Ocul., v. 156, p. 374.

Roche, C. Testing Visual Acuity and Simulators. Caduceé, v. 19, pp. 6-8.

Tests of Visual Acuity. Brit. Jour. Ophth., v. 3, pp. 366-368.

West, L. N. The Eye as an Aid in Diagnosis and Localization of Intracranial Lesions. Charlotte Med. Jour., v. 80, pp. 47-52.

THERAPEUTICS.

Guibert. Subconjunctival Injections of Cow's Milk. Clin. Opht., v. 23, pp. 326-328.

Terrien, F., and Ledoux-Lebard, R. Radium and X-rays in Ophthalmology. Ann. d'Ocul., v. 156, pp. 364-368.

Terson. Chloroform Iodid in Ocular Therapeutics. Ann. d'Ocul., v. 156, pp. 328-333.

Repeated Titles. **Domec** (v. 2, p. 371). Arch. of Ophth., v. 48, p. 398. **Terrien** (v. 1, p. 461). Arch. of Ophth., v. 48, p. 391. **Terson** (v. 1, p. 77). Arch. of Ophth., v. 48, p. 397.

OPERATIONS.

Beykowsky. The Protection of Operated Eyes from Light. Wien. med. Woch., 1918, No. 1.

REFRACTION.

Art, G. Frequency of Astigmatism in 11,704 Patients. Samml. wissenschaftl. Arb., v. 27, Langenabza. Abst., Centralb. f. prakt. Augenh., 1919, v. 43, p. 23.

Pauli, W. E., and Pauli, R. Physiologic Optics for Scientists. Jena, 1918. Gustav Fischer, Abst., Zentralb. f. Physiol., v. 33, p. 399.

Risley, S. D. Genesis of the Myopic Eye. Ohio State Med. Jour., v. 15, pp. 467-472.

Sumner, P. Homatropin in Refraction. California State Jour. of Med., v. 17, pp. 296-297.

Wolff, J. Paresis of Accommodation. Arch. of Ophth., v. 48, pp. 369-70.

Repeated Titles. **Rönne.** (v. 2, p. 305.) Ann. d'Ocul., v. 156, p. 446.

OCULAR MOVEMENTS.

Agatston, S. A. Ophthalmoplegia Interna Following Pneumococcus Conjunctivitis. Arch. of Ophth., v. 48, p. 369.

Barbieri, A. Paralysis of the Ocular Muscles. Semana Med. Buenos Aires, v. 25, p. 751.

Benjamins, C. E. Tonic Reflexes in Muscles of Eye. Arch. Neurol. de physiol., 1918, v. 2, pp. 536-544. Neurol. Bulletin, v. 2, p. 556.

Brouwer, B. Clinical Anatomic Investigation of the Oculo-Motor Nucleus. Zeitschr. f. d. ges. Neurol. u. Psychiat., v. 40, pp. 152-189.

Descomps, P., Euziere, J., and Merle, P. Convergence Following Great Excitement. Presse Méd., v. 26, p. 509.

Holzer, W. F. Determination of Deviation in Squint by the Priestley Smith Method with a Modification to Insure Greater Accuracy. (1 ill., Bibl.) Amer. Jour. Ophth., v. 2, pp. 520-522.

Lereboullet, P., and Mouzon, J. Ocular Paralysis with Hereditary Syphilis in Child. Jour. Nerv. and Ment. Dis., v. 50, p. 91. Paris Méd. 1919, p. 20. Abst., Brit. Jour. Child. Dis., v. 16, p. 121.

Lint, Van. New Technic in Advancement for Strabismus. (Dis.) Ann. d'Ocul., v. 156, pp. 373-4.

Majewski, K. Measurement of Nystagmus. Graefe's Arch. f. Ophth., v. 96, p. 140. Abst., Zentralb. f. Physiol., v. 33, p. 345.

Maxwell, E. M. Concomitant Squint in the Practice of the Late Mr. P. W. Maxwell. Part 1. Brit. Jour. Ophth., v. 3, pp. 340-349.

Mills, L. Effects of Faulty Craniospinal Form and Alignment Upon Eyes. Amer. Jour. Ophth., v. 2, pp. 493-499.

Moron Ruiz, J. Advancement of External Rectus Muscle and the Correction of Convergent Strabismus. (3 ill.) Arch. de Oftal. Hisp.-Amer., v. 19, pp. 336-343.

Riley, H. A. Conjugate Deviation with Astereognosis. Arch. of Ophth., v. 48, pp. 340-343, and 371.

Stickney, O. Abducens Paralysis in Acute Suppurative Otitis Media with Mastoiditis. Laryngoscope, v. 29, pp. 395-399.

Uchermann. Abducens Paralysis Following Operation for Acute Mastoiditis. Norsk Mag. for Laegevidensk., v. 80, July, 1919, p. 770.

Repeated Titles. **Aubineau and Lenoble.** (v. 1, p. 707.) Arch. of Ophth., v. 48, p. 400. **Cantonnet, A.** (v. 1, p. 219.) Amer. Jour. Ophth., v. 2, p. 540. Arch. of Ophth., v. 48, p. 399. **Elschnig.** (v. 2, p. 306.) Ann. d'Ocul., v. 156, p. 443. **Terrien.** (v. 1, p. 462.) Arch. of Ophth., v. 48, p. 400.

CONJUNCTIVA.

Basterra. Primary Bilateral Tuberculosis of the Conjunctiva. Rev. de Med. y Cirug. pract., v. 121, p. 52.

Blatt, N. New Treatment of Trachoma. Wiener klin. Woch., 1918, No. 25, Abst., Centralb. f. prakt. Augenh., v. 43, 1919, p. 29.

Burga, B. Trachoma in Peru. Cron. Med. Lima, v. 35, pp. 360-366.

Cazaux. Trachoma in Tonkin. Caduceé, Paris, v. 18, p. 94.

Conlon, F. A. Conjunctivitis Due to Food Anaphylaxis. (Bibl.) Amer. Jour. Ophth., v. 2, pp. 486-488.

Derby, G. S. Control of Trachoma Among the Alien Labor Companies of the British and American Expeditionary Forces. (6 ill.) Amer. Jour. Ophth., v. 2, pp. 500-508.

Diamare, V. Gonococcus Ophthalmia. Riforma Med., v. 35, p. 420. Abst., Jour. Amer. Med. Assn., v. 73, p. 373.

Early Treatment of Ophthalmia Neonatorum. Brit. Jour. Ophth., v. 3, p. 365.

Kraft, J. E. L., and ten Doesschate. Treatment of Gonorrheal Ophthalmia by Diathermia. Tijdschr. v. Geneesk., July 21, 1917. Abst., Amer. Jour. Ophth., v. 2, p. 541.

Lindner, K. Trachoma. Wiener med. Woch., 1918. No. 1. Abst., Centralb. f. prakt. Augenh., 1919, v. 43, p. 26.

Löwenstein, A. Control of Trachoma in Bosnia-Herzagovinia and Dalmatia. Abst., Centralb. f. prakt. Augenh., 1919, v. 43, p. 27.

McWalter, J. C. 873 Eye Cases in Egypt. Med. Press, v. 108, p. 43.

Meissner, M., and Klein. Acute Conjunctivitis from a Prothesis not Removed for Twelve Years. Woch. f. Therap. u. Hyg. d. Auges., v. 22, p. 49.

Adult Blennorrhea. Woch. f. Therap. u. Hyg. d. Auges., v. 22, p. 49.

Initial Sclerosis of the Bulbar Conjunctiva. Woch. f. Therap. u. Hyg. d. Auges., v. 22, p. 49.

Nicola, S. Treatment of Trachoma. España Oftal., v. 4, June, 1919, pp. 205-210.

Rau. Severe Trachoma. Deutsche med. Woch., 1913, No. 45. Abst., Woch. f. Therap. u. Hyg. d. Auges., v. 17, p. 308.

Reitsch, W. The Treatment of Gonorrheal Blennorrhea by Parenteral Injections. (Bibl.) Woch. f. Therap. u. Hyg. d. Auges., v. 22, pp. 93-95.

Santos-Fernandez, J. Stubbornness of Some Cases of Conjunctivitis. Amer. Jour. Ophth., v. 2, pp. 524-526.

Steiner. Etiology and Prophylaxis of Scrofulous Ocular Affections. Ann. d'Ocul., v. 156, p. 228. Abst. Amer. Jour. Med. Sc., v. 158, p. 288.

Strickler, D. A. Typical Phlyctenular Conjunctivitis. (Dis.) Amer. Jour. Ophth., v. 2, p. 526.

Thierry, J. Trachoma in Chile. Rev. Méd. de Chile, v. 47, p. 70. Abst., Jour. Amer. Med. Assn., v. 73, p. 459.

Wolff, L. K. Scrofulous Ophthalmia. Nederl. Tijdschr. v. Geneesk., v. 1, p. 1168. Abst., Jour. Amer. Med. Assn., v. 73, p. 305.

Repeated Titles. **Musy.** (v. 1, p. 541.) Arch. of Ophth., v. 48, p. 404.

CORNEA AND SCLERA.

Augstein. Chemotherapy of Serpent Ulcer of Cornea. Münch. med. Woch., April, 1916, v. 63, p. 530.

Buxton, L. H. Dumb-bell Keratitis. Med. Press., v. 108, p. 28.

Dulaney, O. Keratitis. Jour. Tennessee St. Med. Assn., v. 12, pp. 80-84.

Guibert. Treatment of Corneal Ulcer. Clin. Opht., v. 23, pp. 323-325.

Haab, O. Alphabet Keratitis. (1 pl.) Beitr. zür Augenh., v. 91, pp. 1-25.

Haselberg. Corneal Transplantation. Berl. Ophth. Gesellsch., June, 1914. Woch. f. Therap. u. Hyg. des Auges., v. 17, p. 318.

Laveran, A. Great Frequency of Keratitis in Dogs Inoculated with Trypanosomes. Bull. Soc. Path. Exot., v. 9, pp. 375-379.

Pacheco Luna, R. Ocular Lesions Consecutive to Injections of Antityphoid Vaccine, Keratitis Herpetica Febrilis. (Bibl.) Amer. Jour. Ophth., v. 2, pp. 488-492.

Pardies, T. Optochin Treatment of Serpent Ulcer. Woch. f. Therap. u. Hyg. des Auges., v. 22, pp. 73-76.

Schoen, H. Relation of Parenchymatous Keratitis to Trauma. Beitr. zür Augenh., v. 88, pp. 599-658.

Stilwill, H. R. Staphyloma of Sclera. Amer. Jour. Ophth., v. 2, p. 528.

Verhoeff, F. H. Keratitis Profunda (or Disciformis?) with Microscopic Examination. (2 ill., Bibl.) Southern Med. Jour., v. 12, pp. 409, 415.

Repeated Titles. **Eperon.** (v. 2, p. 550.) Amer. Jour. Med. Sc., v. 158, p. 289. **Gamper.** (v. 2, p. 306.) Ann. d'Ocul., v. 156, p. 444. **Rönne.** (v. 2, p. 468.) Ann. d'Ocul., v. 156, p. 236. **Weill.** (v. 2, p. 468). Ann. d'Ocul., v. 156, p. 234.

ANTERIOR CHAMBER AND PUPIL.

Barraquer, T. Dilating Muscle of Pupil. Plus Ultra, v. 2, p. 85.

Cabannes. Pupil Reflexes to Light. Jour. de Méd. de Bordeaux, v. 90, p. 222.

Löwenstein. Influence of Blood Vessels upon the Aqueous Humor. Woch. f. Therap. u. Hyg. des Auges., v. 17, p. 374.

Rasquin and Dujardin. Argyll-Robertson Sign. Ann. d'Ocul., v. 156, pp. 393-406.

Suchy, S. Pupillary Reaction. Wiener klin. Woch., 1917, No. 21. Abst., Centralb. f. prakt. Augenh., 1919, v. 43, p. 24.

Repeated Titles. **Dujardin and Rasquin.** (v. 2, p. 373.) Amer. Jour. Med. Sc., v. 158, p. 290.

UVEAL TRACT.

Finnoff, W. C. Macular Choroiditis. (Dis.) Amer. Jour. Ophth., v. 2, p. 528.

Libby, G. F. Disseminated Choroiditis. (Dis.) Amer. Jour. Ophth., v. 2, p. 527.

Santos-Fernandez, J. Persistent Membrane of Iris. Arch. de Oft. Hisp.-Amer., v. 19, pp. 334-336.

Piemont, A. Iridocyclitis with Ocular Hypertension (Arsenobenzol.) Ann. d'Ocul., v. 156, pp. 406-410.

Repeated Titles. **Baumeister.** (v. 2, p. 468.) Ann. d'Ocul., v. 156, p. 257. **Coriat and Boulai.** (v. 1, p. 703.) Arch. of Ophth., v. 48, p. 413. **Franke.** (v. 2, p. 307.) Ann. d'Ocul., v. 156, p. 443. **Prélat.** (v. 1, p. 220.) Brit. Jour. Ophth., v. 3, p. 371. **Ramsay.** (v. 1, p. 879.) Amer. Jour. Ophth., v. 2, p. 537.

SYMPATHETIC DISEASE.

Garcia Mansilla. Sympathetic Ophthalmia Cured by Enucleation of the Sympathizing Eye. Rev. de Med. y. Cirug. pract., v. 118, pp. 33-36.

Morax. Sympathetic Ophthalmia after Evisceration. Soc. d'Opht. de Paris, June, 1919. Ann. d'Ocul., v. 156, p. 421.

Ribstein, W. Sympathetic Ophthalmia following Subconjunctival Scleral Rupture. Centralb. f. prakt. Augenh., v. 43, p. 23.

Truc, H. Sympathetic Ophthalmia. (Dis.) Ann. d'Ocul., v. 156, pp. 333-338, 369-370.

GLAUCOMA.

Deutschmann, R. Trauma and Primary Glaucoma. Beitr. zür. Augenh., v. 91, pp. 26-36.

Sclerectomy and Trepanation after Elliot and Genesis of Choked Disc. Beitr. zür. Augenh., v. 89, pp. 659-705.

Köllner, H. Tension in Glaucoma Simplex. Arch. f. Augenh., v. 83, p. 135; Abst., Zentralb. f. Physiol., v. 33, p. 341.

McCaw, J. A. Keratoglobus or Buphthalmos. Amer. Jour. Ophth., v. 2, p. 528.

Orcutt, D. C. Influenza as a Causative Factor in Acute Glaucoma. (Dis.) Amer. Jour. Ophth., v. 2, pp. 533-536.

Rochat, G. F. Increase of Intraocular Pressure by Stimulation of the Sympathetic Nerve in the Rabbit. Arch. Neurol. di Physiol., 1918, v. 2, pp. 545-551. Abst., Neurol. Bulletin, v. 2, p. 514.

Veasey, C. A. Acute Glaucoma. Arch. of Ophth., v. 48, p. 366.

Wieden. Modification of Technic of Iridectomy. España Oftal., v. 4, May, 1919, p. 169.

Repeated Titles. **Gunnufsen.** (v. 2, p. 468.) Ann. d'Ocul., v. 156, p. 235. **Magitot.** (v. 1, p. 158.) Arch. of Ophth., v. 48, p. 409. **Marbaix.** (v. 1, p. 542.) Arch. of Ophth., v. 48, p. 397. **Morax.** (v. 1, p. 542.) Arch. of Ophth., v. 48, p. 409. **Schindheim.** (v. 2, p. 308.) Ann. d'Ocul., v. 156, p. 444.

CRYSTALLINE LENS.

Castresana, B. Vacuum Extraction of Cataract. Plus-Ultra, v. 2, p. 149.

Cicerale, L. Cortical Blindness from War Wound; Recovery of Vision after Operation. Riforma Med., v. 35, p. 480.

Dor, L. Medical Treatment of Cataract. Clin. Opht., v. 23, pp. 319-323.

Hegner, C. A. Prognosis of Intrabulbar Lens Luxation. (4 ill., Bibl.) Beitr. zür. Augenh., v. 90, pp. 707-770.

Knapp, P. Tardy Formation of Anterior Chamber after Cataract Extraction. Klin. M. f. Augenh., v. 57, p. 85. Abst., Ann. d'Ocul., v. 156, p. 443.

Nagel, C. S. G. Accidental Traumatic Cataract. Calif. State Jour. Med., 1919, v. 17, p. 110.

Rochon-Duvigneaud. Method of Delivering the Lens. Ann. d'Ocul., v. 156, pp. 342-344, 371.

Strickler, D. A. Ectopia Lentis. (Dis.) Amer. Jour. Ophth., v. 2, p. 526.

Tydings, O. Dislocation of Both Lenses. (Dis.) Amer. Jour. Ophth., v. 2, p. 536.

Villard, H. Temporary Paralysis of the Lids in Cataract Operation. (Dis.) (1 ill.) Ann. d'Ocul., v. 156, pp. 352-364, 372.

Weill, G. Cataract Extraction with a Lance Knife. (Dis.) Ann. d'Ocul., v. 156, pp. 338-342, 371.

Zimmermann, C. Fluctuation of Refraction in Developing Cataract. Amer. Jour. Ophth., v. 2, pp. 420-423.

Repeated Titles. **Houwer.** (v. 2, p. 308.) Ann. d'Ocul., v. 156, p. 446. **Roure.** (v. 1, p. 542.) Arch. of Ophth., v. 48, p. 407. **Liégard.** (v. 1, p. 542.) Arch. of Ophth., v. 48, p. 407. **Vogt.** (v. 2, p. 469.) Ann. d'Ocul., v. 156, p. 236.

VITREOUS.

Masuda, T. Vitreous Humor Clouding Following Attacks of Obscure Fever in Kyoto, Japan. Iji-Shimbun, 1917, No. 976. Abst., China Med. Jour., Shanghai, 1918, v. 32, p. 468.

RETINA.

Agatston, S. Congenital Coloboma of the Macula. Arch. of Ophth., v. 48, p. 377.

Bane, W. C. Hemorrhagic Retinitis. Amer. Jour. Ophth., v. 2, p. 528.

Clapp, C. A. Albuminuric Retinitis. Amer. Jour. Ophth., v. 2, p. 537.

Detachment of Retina in Eclampsia and Toxemia of Pregnancy. (10 ill., Bibl.) Amer. Jour. Ophth., v. 2, pp. 474-485.

Danis, M. Hemeralopia on the Belgian Front. Ann. d'Ocul., v. 156, pp. 347-352.

Deutschmann, R. Operative Treatment of Retinal Detachment. Beitr. zür. Augenh., v. 92, pp. 37-75.

Gallemaerts. Cysts of the Retina. (5 ill.) Ann. d'Ocul., v. 156, pp. 319-328.

Histology of Traumatic Chorio-retinitis. Ann. d'Ocul., v. 156, p. 376.

Holm, E. External Exudative Retinitis. Klin. M. f. Augenh., Sept.-Oct., 1917. Abst., Brit. Jour. Ophth., v. 3, p. 383.

Lohman, W. Teaching of Adaptation. Arch. f. Augenh., v. 83, p. 275. Abst. Zentralb. f. Physiol., v. 33, p. 342.

Magitot, A. Adaptation of the Retina and Night Blindness. Paris Méd., v. 26, p. 369-373.

Orcutt, D. C. Embolism of the Central Artery. Amer. Jour. Ophth., v. 2, p. 536.

Uribe-Troncoso, M. Arteriosclerosis and the Eye. Diagnosis of General Disease. (1 ill.) Arch. de Oft. Hisp.-Amer., v. 19, pp. 325-333.

Repeated Titles. **Augstein.** (v. 2, p. 469.) Ann. d'Ocul., v. 156, p. 235. **Dor.** (v. 1, p. 750.) Arch. of Ophth., v. 48, p. 413. **Nechitch.** (v. 2, p. 308.) Arch. of Ophth., v. 48, p. 394. **Salus.** (v. 2, p. 308.) Ann. d'Ocul., v. 156, p. 445.

TOXIC AMBLYOPIAS.

Rightor, H. H. Methyl-Alcohol Blindness. (Dis.) Jour. Arkansas Med. Soc., v. 16, pp. 49-51.

Repeated Titles. **Uhthoff.** (v. 2 p,. 469.) Ann. d'Ocul., v. 156, p. 441.

OPTIC NERVE.

Baute, H. Double Partial Atrophy of Optic Nerve with Lesions of Hypophysis. (2 ill., Bibl.) Ann. d'Ocul., v. 156, pp. 381-393.

Behr, C. Optic Atrophy with Hypophyseal Disease. Klin. M. f. Augenh., v. 57, p. 10. Abst. Ann. d'Ocul., v. 156, p. 441.

Ducamp. Optic Atrophy with Hypophyseal Disease. Soc. d'Opht. de Paris, June, 1919. Ann. d'Ocul., v. 156, p. 419.

Jelgersma, G. Double Peripheral Blindness and Atrophy of Medial and Lower Side of Left Occipital and Temporal Lobes. Psychiat. u. Neurol., pp. 346-360, Bl. 1918.

Libby, G. F. Optic Neuritis. Amer. Jour. Ophth., v. 2, p. 527.

Schoenberg, M. J. Ophthalmo-therapeutic Ignorance Regarding Atrophies. Amer. Jour. Ophth., v. 2, pp. 517-519.

Veasey, C. A. Herpes Zoster Complicated by Acute Retrobulbar Neuritis. Arch. of Ophth., v. 48, pp. 364-367.

Repeated Titles. **Behr.** (v. 2, p. 469.) Ann. d'Ocul., v. 156, p. 237.

VISUAL TRACTS AND CENTERS.

Aubaret. Lesions of Optic Tracts in War Wounds. Ann. d'Ocul., v. 156, p. 368.

Beeley, A. L. Mirror Writing. Monograph, Univ. of Utah. Literary Digest, Aug. 16, 1919, p. 24.

Doesschate, G. ten. Visual Disturbances after Wounds in Back of Head. Nederl. Tijdschr. v. Geneesk., April 12, 1919, p. 1183.

Eaton, E. M. Visual Perception of Solid Form. (5 ill.) Brit. Jour. Ophth., v. 3, pp. 349-363.

Filehne, W. Visual Perception of Size on Earth and in Sky. Abst. Zent. f. Physiol., v. 33, p. 402.

Kappers, C. U. A. Neurobiotaxis Demonstrated by Position of Motor Nuclei of Oblongata. Jour. Nerv. and Ment. Dis., v. 50, pp. 1-16.

Marx, E. Limits of Field of Vision. Nederl. Tijdschr. v. Geneesk., v. 2, 1919, pp. 858-863.

Tyson, H. H. Pituitary Tumors. Arch. of Ophth., v. 48, pp. 368-369.

Repeated Titles. **Früchte.** (v. 2, p. 309.) Ann. d'Ocul., v. 156, p. 445. **Lemiere.** (v. 1, p. 542.) Arch. of Ophth., v. 48, p. 394. **Morax, Moreau, and Castelain.** (v. 2, p. 309.) Amer. Jour. Ophth., v. 2, p. 539.

COLOR VISION.

Hahn, E. Color Sense of Day Birds, and the Oil Globules of Cones. Zeit. f. Wissenschaft. Zool., v. 116, p. 1. Abst. Zent. f. Physiol., v. 33, p. 401.

Ostwald, W. Color Perimeter. Abst. Zent. f. Physiol., v. 33, p. 343.

Waite, G. M. Color Discrimination in Mudminnows and Sticklebacks. Jour. Exp. Zool., v. 27, p. 443.

EYEBALL.

Bergmeister. Enucleation at the Front. Wiener med. Woch., 1918, No. 1. Abst. Cent. f. p. Augenh., v. 43, p. 27.

Van Duyse, M. Congenital Malformation of Eyeball. Gand Univ. Diss., 1919.

Repeated Titles. **Lauber and Henning.** (v. 2, p. 79.) Ann. d'Ocul., v. 156, p. 442.

LACRIMAL APPARATUS.

Gerard. Hemorrhagic Lacrimal Cyst. Soc. d'Opht. de Paris, June, 1919. Ann. d'Ocul., v. 156, p. 422.

Holmes, C. R. Extirpation of Lacrimal Gland in Epiphora. Arch. of Ophth., v. 48, pp. 323-333, and 374-377.

Loeb, C. Cyst Occupying Region of Lacrimal Sac. (Dis.) Amer. Jour. Ophth., v. 2, p. 537.

Ramon Castroviejo y Nobajas. Microscopic Examination of Lacrimal Concretions. España Oftal., v. 4, May, 1919, pp. 173-185, and June, pp. 193-205.

Wiener, A. Radical Treatment of Epiphora. Arch. of Ophth., v. 48, p. 334.

Würdemann, H. V. Abuse of Canalicotomy in Simple Epiphora. Amer. Jour. Ophth., v. 2, p. 542.

Repeated Titles. **Detzel.** (v. 2, p. 174.) Brit. Jour. Ophth., v. 3, p. 382. **Fischer.** (v. 2, p. 470.) Clin. Opht., v. 23, p. 373. **Hegner.** (v. 2, p. 470.) Ann. d'Ocul., v. 156, p. 233.

LIDS

Bellencontre. Chalazion Following Incorrect Refraction. Clin. Opht., v. 23, p. 328.

Heckel, E. B. Autogenous One-piece Epithelial Grafts for Restoration of Lids. (6 ill.) Arch. of Ophth., v. 48, pp. 311-316.

Marshall, A. Edema of Lids Caused by Ants. Jour. Trop. Med. and Hyg., v. 22, p. 117.

Pockley, F. A. Epicanthus and Congenital Ptosis. (3 ill.) Med. Jour. Australia, June 21, 1919, p. 509.

Poulard. Palpebral Autoplasty. Ann. d'Ocul., v. 156, p. 376.

Rosenheck, C. Blepharoptosis of Psychogenic Origin. (2 ill.) Neurol. Bull., v. 2, pp. 239-242.

Snydacker, E. F. Snydacker's Blepharoplasty in Morax's Clinic. (Dis.) Amer. Jour. Ophth., v. 2, pp. 529-533.

Zamoso, C. Congenital Anomaly of Lids. (2 ill.) Arch. de Oft. Hisp.-Amer., v. 19, p. 344.

Repeated Titles. **Leriche.** (v. 2, p. 551.) New York Med. Jour., v. 110, p. 210.

ORBIT.

Aubaret and Ferrand. Forced Dilatation of Orbital Cavity in Prothesis. (Dis.) Ann. d'Ocul., v. 156, p. 374.

Becco, R. Frontal Mucocele. Semana Med., 1919, v. 26, p. 341. Abst. Surg. Gynecol. and Obst., v. 29, p. 136.

Coulomb. Dilatation of Ocular Cavities in Prothesis. Ann. d'Ocul., v. 156, pp. 344-347.

Deve, F. Hydatid Cyst of Orbit. Compt. rend Soc. de Biol., v. 81, p. 111.

Knox, R. X-Ray Therapy in Exophthalmic Goiter. Lancet, Aug. 2, 1919, p. 185.

Poulard. Inclusion of Solid Sphere in Ocular Cavity. Soc. d'Opht. de Paris, June, 1919. Ann. d'Ocul., v. 156, p. 420.

Senise, T. Orbital Syndrome in War Wounds. Ann. di Neurol., 1919, v. 35, p. 12. Abst. Surg., Gynecol. and Obst., v. 29, p. 150.

Wolff, J. Orbital Abscess. Arch. of Ophth., v. 48, p. 370.

Repeated Titles. **Onfray.** (v. 1, p. 543.) Arch. of Ophth., v. 48, p. 402. **Poulard and Real.** (v. 1, p. 543.) Arch. of Ophth., v. 48, p. 402.

PARASITES.

Barsoum, A. Fly-blown Orbits. Bull. Ophth. Soc., Egypt, 1917, p. 64. Brit. Jour. Ophth., v. 3, p. 379.

Repeated Titles. **Cabaut.** (v. 1, p. 622.) Brit. Jour. Ophth., v. 3, p. 380.

TUMORS.

Alger, E. M. Sarcoma of Lacrimal Gland. Arch. of Ophth., v. 48, p. 372.

Sarcoma of Iris and Ciliary Body. (Dis.) Arch. of Ophth., v. 48, p. 373.

Burrows, A. Report of Work of Manchester and District Radium Institute. (16 ill.) Radium, v. 13, pp. 33-43.

Fage. Primary Sarcoma of Iris. Ann. d'Ocul., v. 156, p. 375.

Feingold, M. Granuloma of Cornea. (1 col. pl., Bibl.) Amer. Jour. Ophth., v. 2, pp. 510,517.

Friedenwald, H. Primary Sarcoma of Iris. (1 ill.) Amer. Jour. Ophth., v. 2, p. 523.

Garcia Mansilla. Sarcoma of Optic Nerve. Rev. Med. y Cirug. Pract., v. 118, pp. 21-23.

Hall, G. W. Cerebellar Tumor. Neurol. Bull., v. 2, p. 519.

Maghy, C. Bilateral Glioma of Retina in Girl of 20; Second Eye Excised after Interval of 18 years. (1 col. pl.) Brit. Jour. Ophth., v. 3, pp. 337-340.

Pfingst, A. O. Sarcoma of Orbit. (Dis.) Kentucky Med. Jour., v. 17, p. 316.

Thomson, E. S. Orbital Tumor. Arch. of Ophth., v. 48, p. 373.

Wiesner, D. H. Tumor of Macular Region. Arch. of Ophth., v. 48, p. 371.

Repeated Titles. **Cosmettatos.** (v. 1, p. 543.) Arch. of Ophth., v. 48, p. 404. **Hirsch.** (v. 2, p. 310). Ann. d'Ocul., v. 156, p. 445. **Velhagen.** (v. 2, p. 307). Ann. d'Ocul., v. 156, p. 445.

INJURIES.

Bane, W. C. Iridialysis. Amer. Jour. Ophth., v. 2, p. 528.

Beykowsky. Ocular Injuries in Mines. Wien. med. Woch., 1918, No. 1. Abst. Cent. f. p. Augenh., v. 43, p. 28.

Gallemaerts and Henrard. Radiographic Localization of Intraocular Foreign Bodies. Bull. de l'Acad. de Méd. de Belgique, July, 1914. Abst. Ann. d'Ocul., v. 156, pp. 378-380.

Harlan. Recovery of Sight after Injury. Amer. Jour. Ophth., v. 2, p. 573.

Jennings, J. E. Removal of Foreign Bodies from Cornea. (3 ill.) Jour. Missouri State Med. Soc., v. 16, p. 263.

Kagan, A. Subconjunctival Scleral Rupture with Episcleral Pigmentation Following Contusion. Wiener klin. Rund., 1918, No. 34. Cent. f. p. Augenh., v. 43, p. 25.

Meissner, M., and Klein. Spontaneous Expulsion of Piece of Iron Six Years After Injury. Woch. f. Therap. u. Hyg. d. Auges, v. 22, p. 49.

Meller, J. Retention of Injured Eyes. Wiener klin. Woch., 1917, No. 15. Abst. Cent. f. p. Augenh., v. 43, p. 24.

Moskowitz, S. Iridectomy and Conjunctivoplasty in Unusual Trauma. (6 ill.) New York Med. Jour., v. 110, p. 242.

Reitsch, W. Removal of Foreign Bodies from Cornea. Woch. f. Therap. u. Hyg. d. Auges, v. 22, p. 90.

Richter. Easy Extraction of Foreign Bodies from Eye. (1 ill.) Münch. med. Woch., April, 1916, p. 554.

Soria y Escudero. Rare Ocular Injury. España Oftalm. June, 1919, p. 211.

Spalding, J. A. Partial Preservation of Vision after Bullet Injury of Both Orbits. Arch. of Ophth., v. 48, pp. 317-332.

Stanke, V. Injury of Eyes from Air Pressure of Bursting Shells. Wiener med. Woch., 1918, No. 1. Abst. Cent. f. p. Augenh., v. 43, p. 27.

Repeated Titles. **Böhm,.** (v. 2, p. 471). Ann. d'Ocul., v. 156, p. 233. **Duverger.** (v. 1, p. 703). Arch. of Ophth., v. 48, p. 413. **Thomsen.** (v. 2, p. 311). Ann. d'Ocul, v. 156, p. 444.

PATHOLOGY.

Repeated Titles. **Landolt.** (v. 1, p. 464). Arch. of Ophth., v. 48, p. 391.

GENERAL DISEASES.

Campbell, H. Leprosy of Eye. Siamese Red Cross Med. Jour., v. 1, Pt. 3.

Claude, H., and Schaefer, H. Lethargic Encephalitis. Bull. de la Soc. Med. d. Hop., v. 43, p. 521. Abst., Jour. Amer. Med. Assn., v. 73, p. 455.

Cullom, M. M. Ocular Manifestations of Focal Infection. (Dis.) Jour. Tenn. State Med. Assn., v. 12, pp. 84-92.

Dwyer, J. G. Focal Infection of Eye from Intestinal Tract. Arch. of Ophth., v. 48, p. 344.

Epidemic Encephalitis. Med. Jour. Australia, June 21, 1919, p. 513-514.

Etienne, G. Lethargic Encephalitis. Bull. de la Soc. des Hop., v. 43, p. 482. Abst. Jour. Amer. Med. Assn., v. 73, p. 455.

Heiman, H. Post Influenzal Encephalitis. Amer. Jour. Dis. Child., v. 18, pp. 83-87.

Jacob, P., and Labeaume. Compression of Sympathetic Nerve and Oculo-Cardiac Reflex with Goiter. Bull. de la Soc. Méd. des Hop., v. 43, p. 556. Abst. Jour. Amer. Med. Assn., v. 73, p. 370.

Ophthalmologist and Internist. Virginia Med. Mo., v. 45, p. 97.

Scott, D. G. Adenoids, Conjunctivitis and Photophobia. (Dis.) Med. Rec., v. 95, p. 255.

Sluder, G. Headaches and Eye Disorders of Nasal Origin. (115 ill.) C. V. Mosby, St. Louis, Mo.

Repeated Titles. **Lavagna.** (v. 1, p. 752). Arch. of Ophth., v. 48, p. 394.

COMPARATIVE OPHTHALMOLOGY.

Rochon-Duvigneaud. The Eye of the Eagle. (Dis.) Ann. d'Ocul., v. 156, p. 376.

HYGIENE.

Langworthy, H. G. Report of Committee on Conservation of Hearing and Vision. Iowa State Med. Soc. Jour., v. 9, p. 242.

Preventable Injuries to Eye. Modern Med., v. 26, p. 222.

Solares, F. V. Prophylaxis of Blindness. Rev. de Med. y Cirurg. Pract., v. 123, p. 375.

Weiss, K. E. Photometry in Ocular Hygiene. Woch. f. Therap. u. Hyg. d. Auges, v. 22, pp. 85-88.

Repeated Titles. **Coulomb.** (v. 2, p. 312). Arch. of Ophth., v. 48, p. 391.

OPHTHALMIC SOCIOLOGY.

Blindness in Mexico. Jour. Amer. Med. Assn., v. 73, p. 350.

Brieux. Help Due Blinded Soldiers. Reveille, v. 1, pp. 190-197.

Delord. Reeducation of Blind at Chartres. Ann. d'Ocul., v. 156, pp. 410-418.

Foveau de Courmelles. Ocular Reeducation. Paris Méd., v. 28, pp. 259-261.

Experience of Ophthalmologist During 49 Months of Military Service. Woch. f. Therap. u. Hyg. d. Auges, v. 22, pp. 57-60; 69-70; 73-90.

General Medical Council and Ophthalmologists. Med. Press, v. 159, p. 4.

Heflebower, R. C. Delay in Sending Patient to Eye Specialist. (Medico-legal.) Eclectic Med. Jour., v. 79, pp. 434-436.

Hönig, A. Ophthalmology in War. Wiener med. Woch., 1918, No. 1. Abst. Cent. f. p. Augenh., v. 43, p. 29.

Jackson, E. The Atlantic City Meetings. (1 ill.) Amer. Jour. Ophth., v. 2, p. 543.

Eyesight Tests and Northeastern R. R. Strikes. Lancet, July 26, 1919, p. 160.

Organized Medicine vs. Organized Optometry. Texas State Jour. Med., v. 15, p. 113.

Red Cross Institute for Blind. 1918, 11 pp. Baltimore, Md.

Rehabilitation of Blinded Soldiers. New York Med. Jour., v. 110, p. 335.

Rochon-Duvigneaud. Institute of Ocular Physiology. Ann. d'Ocul., v. 156, pp. 313-319.

Repeated Titles. **Axenfeld.** (v. 2, p. 312). Ann. d'Ocul., v. 156, p. 446.

HISTORY AND BIOGRAPHY.

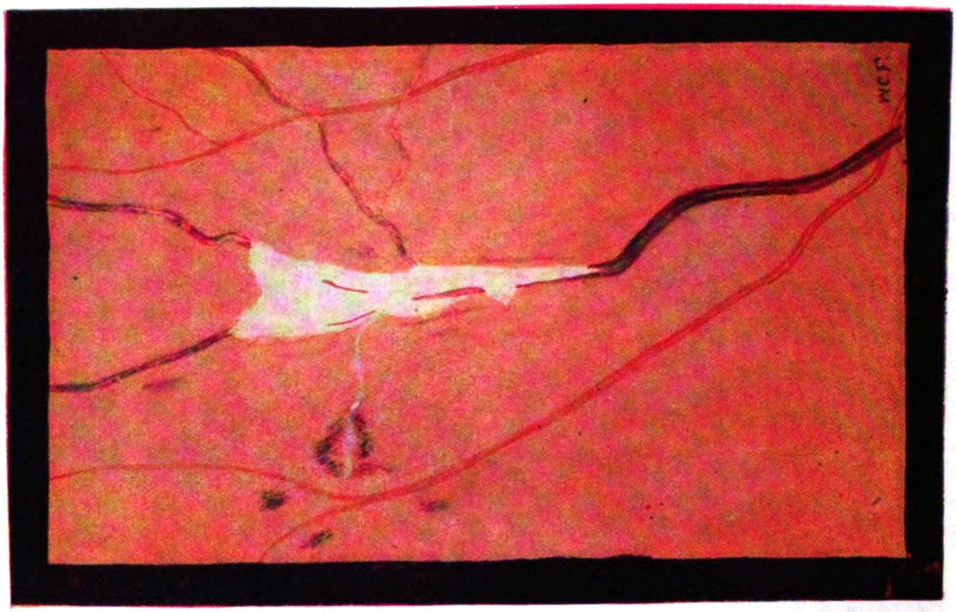
Gebb, H. Repetitions of Ophthalmology. Leipzig, 1918. Abst. Cent. f. p. Augenh., v. 43, p. 12.

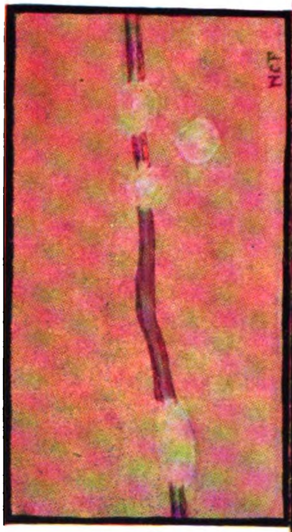
Hirschberg, J. History of Ophthalmology. Berlin, 1918. Abst. Cent. f. p. Augenh., v. 43, pp. 13-14.

Whitham. Johns Hopkins' Base Hospital Unit. Amer. Jour. Ophth., v. 2, p. 537.

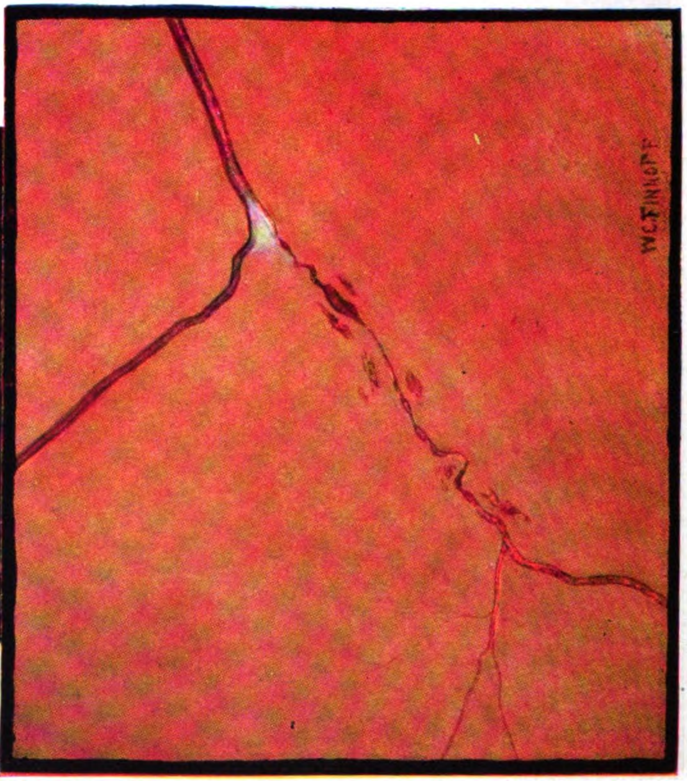
Oxford Ophthalmological Congress. Brit. Jour. Ophth., v. 3, pp. 368-369. Lancet, July 26, 1919, p. 170.

5





3



4

TUBERCULOSIS OF THE RETINAL VESSELS.

AMERICAN JOURNAL OF OPHTHALMOLOGY

Vol. 2 OCTOBER, 1919 No. 10

TUBERCULOSIS OF THE RETINA

EDWARD JACKSON, M. D., AND WILLIAM C. FINNOFF, M. D.

DENVER, COLORADO.

This paper reports three cases of retinal tuberculosis with notes on two previously reported. Read before the American Ophthalmological Society, June 16th, 1919.

Not many cases of this condition will be seen by any one observer; and only a minority are well suited to ophthalmoscopic study. The only way to fill out the ophthalmoscopic picture of this important disease is by placing on record such cases as may from time to time prove available for prolonged ophthalmoscopic observation.

It is important, too, that such records be made to include both in description and in pictorial representation, so far as possible, the minute details that tend to throw farther light on the great field of ophthalmoscopic pathology. There is reason also to present additional evidence that the group of cases here referred to really represents an important form of ocular tuberculosis; and their study may help to a better understanding of the tuberculous process in general. Such considerations seem to justify this report.

Within the last twenty years, several articles have appeared on tuberculosis of the retinal vessels. Prior to that time, the etiology of retinal vasculitis or perivasculitis was unknown. It was not until after Koch[1] had published his articles in 1884, that the causative organism of tuberculosis was known; and in 1890 he called attention[2] to the value of tuberculin as a diagnostic and therapeutic agent. With tuberculin used for diagnostic purposes it was discovered that many obscure ocular conditions were of tuberculous origin, and could be improved or cured by the intelligent administration of tuberculin.

It is to von Hippel[3] that most credit is due for the standardization of the use of tuberculin for diagnostic and therapeutic purposes in diseases of the eyes. He relied on the results obtained from subcutaneous injections of old tuberculin (O. T.); and called attention to the necessity in some instances, where negative results are obtained with the first diagnostic injection, of repeating the test and increasing the dose. He was not satisfied with a negative reaction until five or six injections had been given, with the last dose as high as 5 mg. of the O. T. If neither constitutional nor local reaction was produced with the last injection, tuberculosis was excluded as an etiologic factor. In suspected chronic tuberculosis Verhoeff[4] injects 1 mg. of tuberculin at the first dose; and if the reaction is negative, follows it with an injection of 10 mg. in 48 hours. It would be hazardous to use doses of this size in tuberculosis of the retinal vessels because of the great danger of a severe reaction being produced and followed by a massive hemorrhage into the vitreous.

The following case is of value because a study of the early lesions of tuberculosis of the retinal vessels could be made and because the case has been followed over a period of two and one-half years, during which time the disease in the right eye progressed thru the various stages even with tuberculin treatment, while the condition in the left eye was held under control and apparently cured.

Case I. L. E. B., male, age 28 years (patient of W. C. F.), rancher by occupation. Had chicken pox when a child. When 12 years old had a severe attack of influenza. Since that time has enjoyed the best of health. Denies having had veneral diseases. Has not had a chronic cough or lost weight recently. Three years ago complained of symptoms of eye strain for which glasses were prescribed, which gave relief. Family history good. Sometime in October, 1916, his eyes became very red and painful, but with no marked photophobia or lacrimation. Noticed that when rising suddenly from stooping posture, saw yellow and gray spots to the periphery of the visual fields. There was no conjunctivitis at the time. This lasted about ten days, and gradually cleared up until he was apparently well. The eye was not treated at that time. Shortly after this attack he came to the city and was employed as a bookkeeper.

November 15, 1916, the eyes became painful and red. Photophobia and lacrimation became so severe that they interfered with his work. The symptoms rapidly increased in severity until it was only with the greatest effort that he was able to keep his eyes open.

He consulted me November 17th, complaining of severe photophobia, profuse lacrimation and ocular pain. V.: R. 6/6, L. 6/6. There was marked circumcorneal injection of both eyes. The right cornea had two deeply located fine, oval, grayish infiltrated areas in the upper temporal quadrant. They were 2 mm. from the limbus. The upper opacity was 1½ mm. in diameter and was the denser. The lower was 1 mm. in diameter, and was separated from its fellow by 1 mm. of clear cornea. The left cornea had two opacities in the lower temporal quadrant, which were larger than those in the right cornea, and two small ones, pin point in size, in the pupillary area. See Fig. 1. The infiltrates were grayish in color, and did not stain. No blood vessels were present in the cornea.

Pupils were dilated with atropin and the ophthalmoscope revealed the following: Right Eye. The margin of the optic nerve was ill-defined. Two oval patches, about one-fifth disc diameter in size, of grayish exudate, one covering the superior nasal vein and the other the superior nasal artery, were seen near the margin of the nerve head. (See Fig. 2.) Two similar patches could be seen covering the first upper branch of the superior temporal vein and were about one-half disc diameter apart. The intervening portion of the vein was slightly constricted. The vein was not markedly distended distally to the infiltrations. Because of the marked photophobia the examination was discontinued. Left fundus negative.

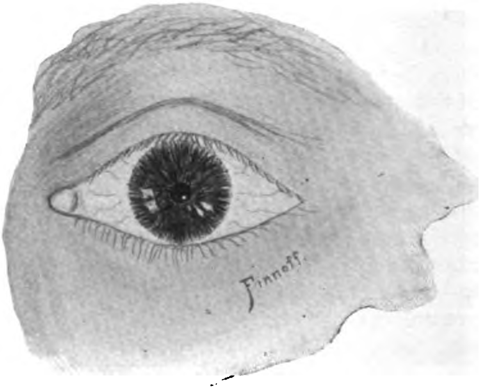


Fig. 1. Case I. Right eye, showing corneal lesions which brought patient under observation.

Atropin and 5% dionin to be used locally, and calomel internally were prescribed, and a subcutaneous injection of old tuberculin was given. A thoro physical examination was made and at this time nothing abnormal was found.

November 20th, pupils dilated and lacrimation less. No changes in corneal opacities. Fundus examination revealed in the right eye numerous small patches of exudate covering the retinal veins. The veins were somewhat distended and near several of the exudates they were irregular. All patches were to the temporal side and in the periphery. Report from dentist negative. Wassermann negative. Urine negative. X-ray of chest, teeth, and nasal sinuses negative.

November 22nd. R. No changes in

corneal opacities. Increase in number of retinal exudates and those that were formerly present have increased slightly in size. L. No change in cornea. There is a slight haziness over inferior temporal vein which is slightly irregular. These changes are apparently a focal reaction to the tuberculin which was given November 15th. There was also a local but no constitutional reaction to tuberculin.

November 26. Corneal opacities not as dense as when last seen. Fundus much the same.

December 2, V. = R. 6/12, L. 6/15. Corneal opacities showed slight improvement. The right fundus presented two large opacities on temporal side near equator. One was about two-thirds size of disc, was yellow and covered the vessels—the other was lower and was about one and one-half times as long as disc and one-half as broad, had irregular edges and was yellow. There were two new opacities about one-fifth disc diameter in size, covering the lower temporal vein. (Figs. 2-4.) In the left eye four small patches were found in the periphery of the fundus covering veins. The veins in the vicinity of the exudates were irregular.

The patient at that time recalled having a suspected tuberculous cow in his herd from which he received his milk. Thinking that there might be a possibility that this was the bovine type of tuberculosis, 1/2,000 mg. of bovine tuberculin was injected subcutaneously on Dec. 5.

December 8th, V. = R. 6/30, L. 6/30. In the right eye along the lower temporal vein, between the patches of exudate, a small hemorrhage was seen. There were several new patches of exudate in the left fundus, all far anterior. (See 3 of colored plate.) I believed these changes to be a reaction to the tuberculin which had been injected December 2.

December 10. Vision same as before. Another small hemorrhage near vein in upper part of right eye, corneal opacities were very much improved.

December 12. Fundus picture much the same.

December 16. V. = R. 6/30, L. 6/30. Corneal opacities were very much smaller and only seen with condensed light and corneal loupe. In the right eye the larger patches of exudate had disappeared and had been replaced by smaller hemorrhages. (See Plate XVI, 4 and 5.) There were other small hemorrhages in the region of the patches of exudate. There were no massive hemorrhages or vitreous haze. The left fundus showed little change from last examinations.

December 24. Two small pin point opacities were still present in the right cornea. For several days the vision had been more blurred in the morning, and cleared during the day. V. = R. 6/7.5—1. The right fundus remained about the same. V. = L. 6/10. The left cornea clear, no patches of exudate. To the nasal side of the fundus the lesions along the vessels had disappeared, but one large patch still remained on the temporal side far forward. Tuberculin 1/50,000 mg. was injected subcutaneously.

December 28. V. = R 6/12 + 3, L. 6/5. Three small opacities were still present in the right cornea. The right fundus showed marked changes. There were numerous new flame-shaped hemorrhages surrounding the veins distally to the opacities. The whole venous system was more congested and the vitreous was slightly hazy. In the left eye three small corneal opacities were again noted but the fundus showed no change since the former examination.

January 8, 1917. There were numerous flame-like hemorrhages scattered over the temporal side of the right fundus. In upper temporal region the hemorrhage had increased greatly in size, and obstructed a view of the vein. In the lower temporal area a whitish band could be seen which resembled the beginning of a retinitis proliferans. The left fundus showed changes also. The large patch of exudate that was seen at the former examination had disappeared. But on the lower temporal vein quite far forward several streaks of exudate had made their appearance. Tuberculin 1/300,000 mg. subcutaneously.

January 11. V. = R. 6/12, L. 6/6 +. Both corneas were clear, but fundus picture was about the same. No focal reaction from the tuberculin.

At this time the man who had been looking after the patient's ranch left him, and it was necessary for him to return to care for his cattle. He took his tuberculin with him, and had his local physician administer it, and said that he would consult an oculist who was located nearer to his home, from time to time. I did not see him again until April 7, 1917.

During his absence a supposedly abscessed tooth was removed, and the nasal sinuses were opened by operation with the hope of removing focal areas of infection. After the operations the vision seemed gradually to improve until April 6, when he noticed that there was a dark line in his lower temporal field, which increased in size during the day and finally included the lower nasal field also. Early in the day he noticed a small stellate black spot in the center of the visual field which was rapidly replaced by a uniform central haze. He had not been doing any unusually strenuous work just prior to these changes. We could find no external cause for it. His tuberculin had not been given regularly during his absence.

On April 7, I saw him again, with V. = R. 5/15, L. 5/5. There was a small oval infiltration in the pupillary area of the right cornea, similar to those that were present earlier in the disease.

A large subhyaloid hemorrhage was present in the upper one-fourth of the fundus. Another large hemorrhage was present in the region of the disc and two smaller ones to the nasal side of it. These were best seen with a + 7 D. lens. The disc was not visible, the view of it being obscured by the hemorrhages and the hazy vitreous.

The left cornea was clear and the only change in the left fundus was a slight variation in the caliber of the lower nasal vein. 1/300,000 mg. tuberculin was given and was not followed by a reaction. The large hemorrhage seen at the last examination was almost entirely absorbed.

May 5th. V. = R. 5/20, L. 5/5 +. A few strands of connective tissue could be seen in the lower temporal side of the right fundus, which is the first sign of a retinitis proliferans, the vitreous was not so hazy and the disc outline could be faintly seen.

In the left vitreous a small mossy floater was seen, and on the extreme anterior portion of one of the branches of the upper nasal vein some patches of exudate were present. The nerve was red and its edges were hazy. 1/250,000 mg. of tuberculin was given subcutaneously.

May 7th. V. = R. 5/30, L. 5/5—2. No other change in fundus.

May 19th. Tuberculin 1/200,000 mg. subcutaneously. V. = R. 5/60, L. 5/5+. Righ eye hazy to temporal side of fundus. More strands of connective tissue below. Left fundus no pathologic changes seen.

May 21st. No changes since May 19.

Patient was again seen June 4, V. = R. 3/60, L. 5/3. There was no marked change from when last observed. 1/175,000 mg. of tuberculin given.

The patient was seen by me July 9th, 1917, a few weeks prior to my entering the military service, and at that time he showed the following: V. = R. 5/60 +, L. 5/4. The strands of connective tissue below and to the temporal field were getting whiter, but no other changes were observed.

During my absence Dr. Jackson noted the following:

September 24, 1917. V. = R. 0.08, L. 1/4. R. some fundus reflex in all directions. General haziness of vitreous. No fresh hemorrhages. Large masses of connective tissue getting white, avascular, below and to the disc.

March 8, 1918. Cleared up until two weeks ago when image seemed distorted and since has become clouded. Caused by pitching hay.

September 14, 1918. One hemorrhage the last of July, which has cleared up again. V. = R. 0.2+, L. 1.4. Right vision best eccentric, looking to right (Temporal field.).

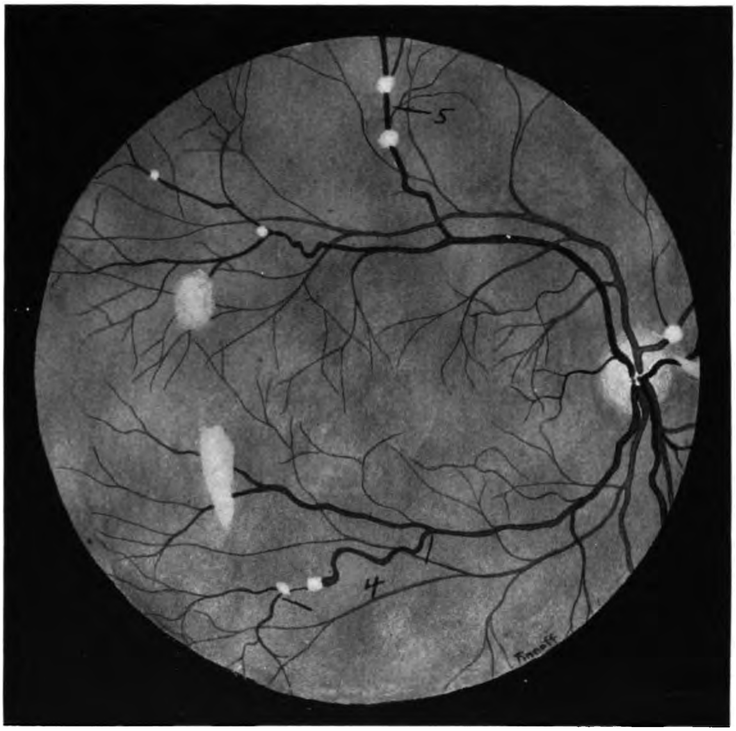


FIG. 2.—RIGHT FUNDUS, DECEMBER 2, 1916. THE 4 AND 5 INDICATE PORTIONS SHOWN IN DETAIL AT A LATER DATE ON COLORED PLATE XVI.

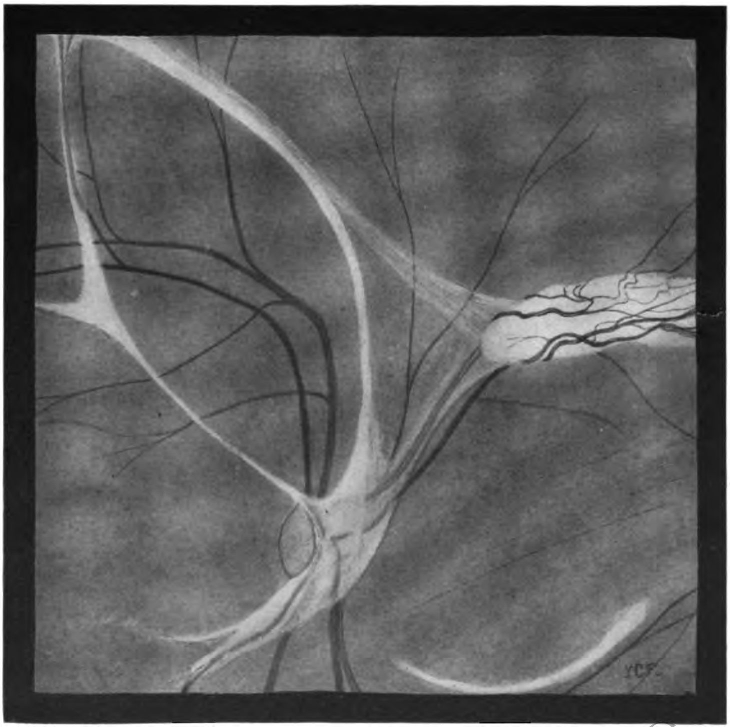


FIG. 6.—BANDS OF RETINITIS PROLIFERANS IN RIGHT EYE, AS SEEN TWO AND ONE-HALF YEARS AFTER ONSET OF THE DISEASE.

Ophthalmoscope. Right. Strands of white tissue and haze in lower nasal quadrant. Upper temporal almost normal to periphery. Disc or macula not seen. Some opacity far forward, chiefly on nasal side.

June 20, 1919. V. = R. 0.33, L. 1.4. The ophthalmoscope showed in the right eye the appearances of retinitis proliferans, as shown in Fig. 6.

COMMENT. In this case tuberculosis of the retinal vessels would not have been detected, until after hemorrhages were present and vision materially lowered, if it had not been for the corneal involvement which caused the photophobia and called the patient's attention to his eyes. Doubtless many of the cases of massive hemorrhage into the vitreous have the same lesions of the retinal vessels, but attention is not attracted to the eyes until the vision is disturbed.

With the history of the patient's drinking milk that was obtained from a tuberculous cow, and with the marked focal reaction after the administration of bovine tuberculin, it seems probable that the condition was the result of an infection with bovine tubercle bacilli.

The retinal involvement began as a perivasculitis and with only one exception (Fig. 2) the areas of infiltration were confined to the perivascular spaces of the veins; but, as the disease progressed in the right eye, the walls of the vessels became involved and a true phlebitis occurred. (Plate XVI, Fig. 4).

The necessity of using very small doses of tuberculin both for diagnostic and therapeutic purposes is illustrated in this case, for with as small a therapeutic dose as 1/50,000 mg. a marked focal reaction apparently took place, and caused the changes which were seen in the right eye, Dec. 28, 1916. The following dose was decreased to 1/300,000 mg. and the subsequent doses were very cautiously increased with no farther serious reactions. Tuberculin apparently had a beneficial action on the left eye in this case, for it was started when the retinal lesions had first manifested themselves in that eye and they disappeared shortly after their appearance. It is also possible that it had a detrimental influence on the right eye.

CASE II. R. B. T. Clergyman (patient of E. J.), aged 33, when he came in 1906, for a change of the glasses he had been wearing for six years. For four years he had noticed distant vision growing indistinct, and his lenses were found insufficient to correct his M. As. He required R.—2.50 ⊃ +1.50 cyl. Ax. 67° V. = 1.1. L.—2.50 ⊃ + 1.75 cyl. Ax. 95° V.= 1.1. Both 1.2.

1911. 9.27. His vision had again grown indistinct from a slight increase of the myopic astigmatism, and change in its meridians. His new correcting lenses again gave V.= 1.2.

1916. 1.25. He had lost much sleep lately, and noticed muscae, and lids felt "granulated." There was some venous hyperemia and papillary roughening of the palpebral conjunctiva. V.= 1.1 in each eye. Ointment of yellow oxide of mercury 1:180, and rest from reading, gave relief.

1916. 12.5. He had lately noticed muscae before left eye and required a slight change of the left lens, which again gave relief. L.—3 ⊃ +2 cyl. Ax. 100° = 1.1. His accommodation was 5 D.

He had come to Colorado in 1900, had suffered from obscure pulmonary symptoms, poor general health and tuberculosis of the testes, which latter were removed three years later.

1917. 2.19. A spot before the left eye has been growing worse. His corrected vision is only 0.5. Ophthalmoscope, L. Pupil dilated with homatropin. Media clear. The macula shows 20 or more rather faint grayish white spots, arranged in lines radiating from the fovea. The retinal veins are all somewhat dilated and tortuous; but es-especially the upper temporal and its branches. In the upper temporal retina are many small flame-shaped hemorrhages. These begin two disc diameters from the disc, and extend up and forward to the periphery of the visible fundus. He was referred to Dr. C. N. Meader, who found slight roughening of the respiratory sounds and dullness at the apices, which he took to be evidence of an old lesion; but no other evidence of active tuberculosis.

2.19. He received 1/10 mg. of old tuberculin. This caused a distinct general reaction including disturbance of blood pressure and nausea, which was taken to indicate an adrenal lesion. But there was no objective evidence of a focal reaction in the eye. Vision was unchanged, except that he complained that a distortion of objects seen with L. seemed slightly increased.

3.5. Began use of 1/100,000 mg. bacillus emulsion once a week gradually increasing the dose.

3.16. About 22 hours after an increased dose of tuberculin, the optic discs looked slightly redder, and he noticed more distortion of objects with this eye than before the dose was given.

4.3. After receiving tuberculin yesterday, he noticed more distortion. "Things looked drunk and compressed laterally." V.= 0.5.

4.12. V. =0.7. The white spots in the macula are much more distinct than they were two months ago. There are remains of several hemorrhages in the upper retina, the region directly above the disc being more involved than at first. Some of the veins are obscured at the crossings.

5.3. V.= 0.6, but was worse after the last dose of tuberculin, 9 days ago.

7.2. V. = 0.8. He thinks it was better two weeks ago. Since then he got over-tired, driving his car on a trip of about 500 miles thru the mountains.

7.23. V. = 0.7. Could not rest so much as he wished lately. Vision "confused" since he had two tuberculin injections with only a week interval. After this two weeks' intervals were allowed.

At this time the white spots in and about the macula were most numerous 50 or 60 and very sharp and distinct. Small hemorrhages still occurred, but they were getting less numerous. The upper temporal retina was hazy. But other portions remained normal. After this all the appearances of retinal disease gradually diminished.

1918. 12.3. 1/10 mg. gave pain in elbow for last 2 months.

1918. 1.28. There are still about 15 small white spots in the upper nasal quadrant of the macula, none of them as large as the largest retinal artery in diameter. The upper veins are still large and tortuous. The haziness of the retina has almost or quite cleared up. There are no hemorrhages.

10.23. The retina above the disc was hazy and swollen and two small indefinite flame-shaped hemorrhages were found. The veins of this region were rather large and slightly tortuous. The macula appeared quite normal. V. = 1.?

11.22. The retina above the disc has cleared up. The vessels all appear normal. R. — 2.25 ≍ + 1.25 Cyl. ax. 80° = 1.1. L. — 3. ≍ + 2.50 Cyl. ax. 103° = 1.

The left eye has continued normal. The right eye has not been affected at any time. At no time was the patient's general health much impaired. Apart from the tuberculin reaction there was no fever, and while under treatment he gained 11 pounds in weight. He continued the whole time walking and riding thru the mountains, leading an active rather strenuous outdoor life, in the care of his large mountain parish between 6,000 and 8,000 feet above the sea level.

Case III. Male aged 25, while studying hard for the Priesthood two years before and in poor health, lost the sight of his left eye from vitreous hemorrhage. In February, 2 months later, his eye was well again. In March the right eye became blind from the same cause, but it had recovered in August. In September the hemorrhages started again. He saw Dr. Arnold Knapp of New York City, and in June last he had been put upon the use of tuberculin, and his sight in both eyes had cleared so that he could read again. Then the right rapidly grew worse, and he was sent from Eastern New York to Colorado.

1917. 12.19. Vision R. moving fingers at one foot in the extreme temporal field. L. = + 0.25 Cyl. ax. 170° = 1.1.

Ophthalmoscope. R. under atropin, cornea and lens clear, vitreous clouded, no fundus details visible. There is a grayish red reflex in all directions and floating masses, which in the lower temporal vitreous look almost like detached retina, but no vessels are found. Left eye slight haziness of vitreous. Choroid rather patchy and "moth eaten," but optic disc and retinal vessels normal.

Locally hot stupes and atropin were employed for the right eye, and he was referred to Dr. C. N. Meader, who found infiltration of apices of the lungs, especially the right; and put him on general treatment and regimen for tuberculosis. But without tuberculin treatment.

1918. 1.18. The right eye shows a yellowish gray reflex without details over the whole fundus, except the anterior nasal portion which is dark. He has gained 3 pounds in weight.

2.1. The anterior nasal portion is clearing. V. R. = 1/500.

2.15. A fresh hemorrhage occurred in the lower portion of the vitreous, noticed as a black mass in the upper field of vision and increased haziness.

4.5. There was another fresh hemorrhage seen as a black mass in the lower vitreous.

5.3. There were some whitish masses in the vitreous up and out, and fainter red reflex in other directions. No vessels visible on the masses. His general condition is better, and he can walk five miles without feeling the worse for it.

June 6, R. V. = 0.002. A whitish mass in vitreous, seen with a 12.D. lens, shows fine vessels; and masses of vitreous opacity are seen toward the periphery of the fundus.

8.15. R. V. = 0.004. Ophthalmoscopic findings about as before.

1919. 1.29. R. There is a dense general haze of the vitreous, permitting a moderate reflex. But no fresh hemorrhages since last noted. V. = 0.05.

Left, V. = 1.2. Fundus normal but one distinct linear opacity in vitreous to nasal side of center.

Earlier Cases. Regarding the cases previously reported it is of interest to note that the patient whose fundus condition was illustrated in plate facing p. 579, vol. 14, of the Transactions of this Society[5] has remained in good health, with practically no change in the retinal condition since that time, corrected vision 0.8 when last examined.

Mrs. W. R. L., whose case was alluded to in the same paper (detailed report elsewhere[6]), after months of recurring hemorrhages had recovered, V. R. = 0.06, L. 0.4. She seemed in good health for 3 months after the birth of her child, but gradually lost weight, and felt less well.

1916. 3.6. Her vision was R. 0.06, L. 0.4. Six weeks later she noticed some disturbance of vision.

4.28. V. R. = 0.06 L. 0.15. The ophthalmoscope showed decidedly increased clouding of the vitreous, but no fresh hemorrhage.

5.1. A fresh hemorrhage occurred the evening of April 29th, in the left eye. Vision is reduced to perception of hand movements. The hemorrhage is located in the temporal part of the vitreous. To the nasal side the fundus reflex is good and there are whitish masses well forward: (25 to 35 D. H.)

5.15. L. Has gradually improved, vitreous clearing. V. = 0.07.

5.22. Two days ago a fresh hemorrhage occurred in the right eye, which shows general haze of the vitreous and V. = moving shadows.

5.29. V. = L. 0.2. It was worse again six days ago, so that she had to be led around.

6.20. Sight was better until 8 days ago, then worse, since then clearing. Now V. R. 0.002, L. 0.1.

7.27. Feels the heat, appetite depressed. Sight beginning to improve after fresh hemorrhage 3 days ago.

8.25. V. R. = 0.012, L. 0.05.

9.25. Fresh clouding 3 weeks ago. Improving since. V. R. = 0.012, L. = .005.

10.13. She was sent from the city to her old home on a farm in South Dakota.

1917. 2.13. She has lived out of doors, gained weight and strength. V. R. = 0.06, L. 0.35.

3.8. V. has dropped to 0.1 in L., the better eye, with fresh clouding.

3.31. V. = R. 0.12, L. 0.003.

5.23. Sight has steadily improved. R. = 0.12, L. 0.25.

11.27. There was a new hemorrhage in July and after that steady improvement. V. = R. 0.14, L. 0.4.

1918. 1.8. Had some disturbance of vision 3 weeks ago, but no evidence of fresh hemorrhage. V. = R. 0.01, L. 0.04.

1.18. Sight seems worse. V. = R. 0.01, L. 0.4. She was again put on tuberculin which had been discontinued for 15 months.

2.16. There has been aching about her right ear, and a fresh hemorrhage into the vitreous in the left. V. R. = 0.012, L. moving objects.

3.11. She again returned to South Dakota.

For about two years the discs and most of the fundus have been invisible. When the vitreous was most clear, masses of white retinitis proliferans could be seen thru it.

CONCLUSIONS: From the cases now reported it appears that:

Retinal tuberculosis begins by the appearance of white infiltrates in front of certain retinal vessels, most frequently the veins. Later these particular vessels show all the signs of perivasculitis and the affected portions of the veins may be greatly altered in caliber. At this stage hemorrhages occur and the patient is likely to first come under observation for impairment of vision.

The hemorrhages may be comparatively small and confined to the retina throughout the course of the disease; clearing up in the end, so as to leave no trace visible with the ophthalmoscope, and good restoration of vision. In other cases the hemorrhages are massive, pushing off the vitreous or bursting into it, and followed by the well known picture of retinitis proliferans and great permanent impairment of vision.

In many cases in which the eye-ground remains visible thruout, white dots resembling those seen in renal retinitis are formed in the macula; causing impairment of vision, but less than their appearance would lead us to expect, and subsequently clearing up entirely.

Often both eyes are affected in the beginning, but one may remain only slightly involved, and recover completely, while the other is greatly and permanently damaged by hemorrhage.

The course of retinal tuberculosis is more protracted than that of other diseases likely to cause some of the same ophthalmoscopic symptoms.

Cases not attended with pyrexia, or extensive tuberculous lesions in other parts of the body, do well on small doses of tuberculin given at intervals of at least one week; and all cases require the general regimen and treatment for combating tuberculosis.

REFERENCES.

1. Koch. Mitt. a. d. k. Gesund. 1884, 2. p. 1.
2. Koch. Heilmittel gegen die Tuberculose Heft 1-2. Berlin, 1890-91.
3. Hippel E. v. Graefe's Arch. f. Ophth. v. 59, p. 1.
4. Verhoeff. Trans. Amer. Ophth. Soc. v. 13, p. 486.
5. Jackson. Trans. Amer. Ophth. Soc. v. 14, p. 577.
6. Jackson. Trans. Colo. Ophth. Congress, 1915, p. 203.

THE TREATMENT OF DACRYOCYSTITIS BY CURETTAGE. (THOMPSON): SUPPLEMENTED BY IMMEDIATE RAPID DILATATION OF THE LACRIMONASAL DUCT

By John Green, Jr., M. D.,

ST. LOUIS, MO.

This paper discusses the reasons for using this method of treatment, describes it, reports a series of cases treated by it, and proposes certain instruments for use in such operations. Read before the Section on Ophthalmology, American Medical Association, June, 1919.

In dealing surgically with any diseased organ the method of choice should be that which respects, as far as possible, the anatomic integrity of the organ and its physiologic function. It is, of course, not always possible to attain this ideal. Conservative, or what, in this connection, might be better termed "preservative" surgery, may err in attempting to save an organ which can never function normally, and which may, if retained, be a source of continued trouble.

Interference with the free drainage of any of the mucous membrane lined cavities having an outlet is inevitably followed by infection and inflammation,—e. g., cystitis consecutive to enlarged prostate, and dacryocystitis following occlusion of the nasal duct. In cases of this character the surgical method of choice should, if possible, be that which respects the integrity of the organ and seeks to reestablish permanent drainage thru the outlet designed by nature for that purpose.

The assumption that, as a prerequisite to the treatment of dacryocystitis, it was necessary to secure adequate and permanent drainage led to the use of inflexible probes shaped to conform to the course and supposed caliber of the nasal duct. One of the earliest to advocate and practice this method was Bowman, who also suggested an incision of the canaliculus for the purpose of permitting the entrance of larger probes.

It cannot be gainsaid that occasionally this method led to the reestablishment of patency, with resultant diminution or abolition of the discharge from the sac. But the failures far outnumbered the successes; the treatment was painful, the probing had to be kept up for months or years and even then there was no assurance that the opening so laboriously secured would remain open permanently. One reason for failure lay in the inadequate size of Bowman's probes—his largest (No. 6) being only 1.5 mm. in diameter, whereas, as has been shown by Theobald[1] the average diameter of the lacrimonasal canal is something over 4 mm. Many who practiced Bowman's method in their early professional career eventually became convinced of its futility and abandoned probes altogether, contenting themselves with frequent syringing of the sac thru the slit canaliculus. Others pinned their faith to styles worn permanently. Still others resorted to the the use of large probes (Theobald and Ziegler) or adopted excision or destruction of the sac.

With improvement in the technic of sac removal or sac destruction, the most annoying and potentially dangerous feature of this disease—accumulation of pus in the sac—was immediately done away with. Equally striking would be the improvement or cure of the attendant lacrimal conjunctivitis, so that life again became bearable to the individual who had, possibly for years, carried about a purulent, watery eye. This operation, improvement as it was over older methods and very widely adopted, had two serious drawbacks,—it necessarily destroyed the drainage apparatus and left the eye more or less watery. The amount of moisture in the eye after operation varied from practically no increase in the surface film normal to the eye with drainage apparatus intact, to a suffusion of the eye with tears which constantly overflowed and produced a moist eczema of the skin quite as annoying to the patient as the former purulent accumulation in the sac. In an effort to lessen this annoying epiphora the palpebral portion of the lacrimal gland was sometimes removed. The continuance of pus formation after operation was not altogether rare and indicated failure to remove or destroy all the mucosa of the sac.

It is difficult to determine just what percentage of extirpations of the sac are successful. The majority of these cases occur in dispensary patients who are notoriously apt to pass from observation before the interested surgeon has a chance to determine the final result of his operation. As far as dispensary patients are concerned, it is probable that the report made to Mosher by his ophthalmic house officers[2] that "a third of the results were satisfactory" is not far wide of the mark. If this figure approximates the percentage of successful results, it is not surprising that many sac extirpators have sought other methods which might conceivably produce a higher percentage of successes. I suspect, too, that many who are willing to resort to extirpation of the sac as a last resort, rebel against a method which destroys an organ and hence its physiologic function, and will seek first to secure some form of permanent drainage of the suppurating sac, whether that be thru the natural opening or by an opening artificially made directly from the nose to the sac. The endonasal operation on the lacrimal sac has in recent years engaged the attention of rhinologists, and a variety of more or less closely related procedures have been proposed. This subject was thoroly discussed before this section in 1917 by Chamberlain.[3]

As the aim of any intranasal operation is to create a permanent pathway for the tears and secretions from the sac, and if that permanent pathway is not secured the operation must be accounted a failure, it is interesting to note the opinions of some of the expert rhinologists who have devoted special attention to this operation. Chamberlain says: "Whether or not the physiologic pathway for the tears into the nose can be maintained permanently, in a sufficient percentage of cases at the hands of the average rhinologist, is a question which time alone can answer." Mosher, in discussion, remarked that "all intranasal methods must face the danger of reclosure of the canal," and that "every form of intranasal operation on the lacrimal sac and the nasal duct is only a temporary success unless supplemented with frequent probing or the prolonged wearing of a style."

In view of the foregoing, it can hardly be affirmed that an impeccable surgical method for dacryocystitis has yet been evolved. It behooves us all, therefore, to take cognizance of, and put into practice, any new proposal which conceivably can aid in overcoming this intractable disease. Such a proposal was recently put forward by W. R. Thompson.[4] Before describing his method of treatment, Thompson presents some reasons in contravention of the generally accepted belief that disease of the lacrimal duct is of nasal origin and in support of his theory that solid foreign material carried by the tears thru the punctum and sac finally lodges on a fold of mucous membrane in the bony duct there to form the nucleus of an obstruction, which shall eventually block the canal. Thompson says:

"It is the function of the lacrimal canals, sac and nasal duct to convey not only liquids to the nasal cavity from the conjunctival sac, but also such solid matter as passes thru the canaliculi. The nasal duct is lined with mucous membrane continuous with the conjunctiva, which contains numerous folds resembling valves. It not only seems possible, but it is very probable, that some of these foreign bodies may lodge and become fixed in these folds . . . It requires only a short time for a fixed foreign body to create irritation and erosion of the surrounding structures as in the case of a foreign body in the nares. When sufficient time has elapsed these foreign bodies increase in size by the deposition of salts from the tears and serum.

"The clinical history of stricture of the nasal duct from its earliest manifestations (the stage of epiphora) to the time of complete closure with extensive pus formation or mucocele, is exactly what would be expected as the result of the presence of a foreign body in the duct with its irresistible tendencies to inflammation, ulceration and accretion."

It is a well known fact that obstructions of the canaliculi may occur thru the entrance of foreign bodies from the conjunctival sac. It would indeed be surprising if, occasionally, these minute bodies which in one manner or another find their way into the eyes, should not, if they fail to find a fixed position on the cornea, bulbar or palpebral conjunctiva, be swept into the puncta, especially the lower one. Cilia, broken off or shed, not rarely find their way into the punctum and cause much irritation until extracted. I have on two occasions removed short hairs (not over 2 mm. long) from the puncta. The signs of irritation began shortly after a haircut so that it is reasonable to suppose that the extracted hair was a fragment of the scalp hair and not a cilium. A foreign body carried deeper into the canaliculus would in all probability form the nucleus of a dacryolith by the deposition of lime salts. It is well known, too, as noted by Weeks[5], that occasionally fungoid masses due to the presence of penicillium, leptothrix, streptothrix or actinomyces, may remain in the canaliculus for years, causing slight disturbance and a small amount of mucopurulent secretion. Theobald notes that bits of the beards of wheat and barley have been found lodged in the canaliculi. Polypi, too, have been met with in the lacrimal sac and by obstructing the passage of tears into the nose, gave rise to symptoms resembling those of stenosis of the duct.

The lacrimal drainage apparatus is a continuous mucous-membrane-lined canal of varying caliber extending from the puncta to the nasal orifice of the bony duct. Once a foreign body has lodged in the canaliculus, it may, of course, remain there and form the nucleus of a dacryolith. On the other hand, there are no natural barriers to its passage into the sac and down into the duct. In the duct its progress might very well be interrupted by one of the folds or rugae into which the mucous membrane of the duct is thrown. Assuming that such lodgment occurs, what is to prevent the foreign body forming at this site the nucleus of a lime salt deposit? Whether or not such a mass grows sufficiently large actually to occlude the lumen, the simple fact that it remains in prolonged contact with the mucous membrane would lead to inflammation, ulceration and eventually to the formation of granulation tissue. That such granulation tissue does occur in the bony duct is affirmed by Ziegler.[6]

Even if we reject Dr. Thompson's very plausible theory, we must assume that the mucous membrane lining the sac and the duct is chronically inflamed. It may even be, as stated by Fergus,[7] that the essence of dacryocystitis is a septic mucous membrane and not a stricture. Surgical methods hitherto have not been directed against the diseased mucosa, a fact which may account for many failures in treatment.

If, then, we are dealing with a mucous membrane which presents polypi, areas of ulceration, and granulation tissue, it is essential that such products of inflammation should be gotten rid of preparatory to topical treatment of the mucous membrane. And this is precisely the rationale of Dr. Thompson's method. The steps of his operation are as follows:

The canaliculus is freely slit in order to permit the entrance of a large size Buck's flexible ear curette. In the presence of pus in the sac the walls are gently curetted. In the absence of sac infection, the small size curette is entered in the duct the same as a probe. When the obstruction is reached gentle pressure is made in connection with an augur-like motion until the curette finds its way into the nasal cavity. The instrument should be manipulated until it passes easily thru the stricture and the entire duct. The next larger size is to be used in the same manner and so on until a curette practically the size of the duct will pass easily into the nose and all sensation of roughness at the site of the stricture has been removed. The operation is completed by applying tr. iodin lightly to the walls of the sac and duct.

A general anesthetic has been found necessary for children and some nervous adults. For others a preliminary hypodermic injection of morphin, 0.5 per cent cocain in the conjunctival and lacrimal sacs, and a subcutaneous injection of one-half per cent cocain in the vicinity of the sac has given sufficient anesthesia.

Although curettage of the sac and duct as an auxiliary method of treating dacryocystitis is not altogether new, Dr. Thompson should be credited with applying it as the principal feature of an operative measure. Landolt and Gygax[8] advocate curettage of the sac and duct "with a small curved sharp fenestrated spoon" when syringing and probing fail to relieve or when "the patient has but a few days to spare for treatment." Ziegler[9], whose advocacy of rapid dilatation of the nasal duct is so well known, pictures a lacrimal curette the use of which he thus describes: "If proliferation occurs in the lumen of the duct I employ a lacrimal curette to remove the granulomata. . . . . The procedure is simple and the result will often prove most gratifying." It is very evident that Ziegler did not consider curettage an essential feature of his operation, but useful only as an adjuvant in exceptional cases.

As will be noted from the case reports a number of my patients operated on according to the technic of Dr. Thompson, presented themselves weeks or months later with recurrences. Unquestionably curettage causes a good deal of primary postoperative reaction with serous exudate and swelling of the mucosa, which may be sufficient to block the canal. Undrained fluid accumulating in the sac forms an excellent culture medium for the propagation of whatever organisms remain, and hence pus in expressible quantities may occur. Reasoning thus, it seemed to me that if curettage were supplemented by immediate rapid dilatation of the bony duct, there would be less likelihood of temporary occlusion; and thus drainage would at all times be sufficiently free to prevent accumulation in the sac. In this connection it is interesting to note that rapid dilatation to insure adequate drainage has recently been practiced by Verhoeff[10] with gratifying results in connection with his revival of Agnew's operation in acute phlegmon of the sac.

My present procedure is as follows: After slightly dilating the punctum with a conical probe the sac is irrigated with $HgCl_2$ 1/5000 and a few drops of cocain 5% with epinephrin injected. The lower canaliculus is then freely slit. The medium sized curette is passed to the sac and the surface gently curetted. A moderate sized probe, Theobald 5 or 6, is then introduced and passed to the nostril. The purpose of this preliminary probing is twofold, (1) to insure that the curette shall find its way into the lumen of the duct and avoid the possibility of a false passage. (Dr. Thompson, in a personal communication, states that, in his opinion, there is no necessity for this precaution); and (2) to create an opening sufficient to permit an anesthetic solution to come in contact with the mucous membrane. On withdrawing the probe I inject a few drops of a 10 per cent solution of cocain (with epinephrin) and repeat twice at two-minute intervals. During the injection the patient is instructed to bend his head forward so that the strong cocain solution shall emerge from the nostril. By this method I have obtained adequate anesthesia for the subsequent steps and have not found it necessary to give a hypodermic of morphin or to inject cocain subcutaneously in the region of the sac. The curettage is then carried out according to the technic described by Thompson.

The diameter of the curetting ring of Buck's largest curette is 3 mm., so that it is obvious that a slightly smaller probe can now be readily passed to the nostril. Beginning with a probe of this size (T.11), I introduce one after another, 12, 13 and 14, and in several cases T. 15 and 16. It goes without saying that very firm pressure must be exerted in introducing these large probes and one sometimes hears a crackling sound which, no doubt, indicates slight fracture of the bony walls of the duct. This has been noted by both Theobald and Ziegler as a necessary concomitant in passing large probes, and they agree—and I concur in the opinion—that "nothing more serious than ecchymosis has followed." An applicator formed by wrapping absorbent cotton tightly around the ring of the smallest sized curette is used to apply Tr. iodin lightly to the walls of the sac and duct.

As a rule, the postoperative reaction is exceedingly slight. There is dull aching pain, lasting several hours, but never, in my experience, so severe as to require a narcotic. Occasionally there is considerable edema of the lids and cheek adjacent. Iced applications, a boric acid wash and a bland ointment suffice for the immediate after treatment. For about a week following the operation the region of the sac remains sensitive to pressure.

The immediate and gratifying effect of the operation—and this has been true of every case—is the prompt cessation of pus formation in the sac. To be strictly within the bounds of truth, one should say, rather, that no pus can be pressed out of the sac into the conjunctival sac. If there be any secretion, whether of a purulent, mucoid or serous nature, it is evidently efficiently drained thru the dilated bony duct. If I am able to keep the patient under observation, I am in the habit of passing a moderate sized probe, say Theobald 10, about once in three weeks for the double purpose of keeping the slit canaliculus stretched and of ensuring an adequate lumen to the bony duct.

A probe of this size passes readily and after cocainization, almost painlessly. Many of these cases give evidence at the operation of denuded bone. Subsequent probings give the impression of the probe being in contact with normal mucous membrane.

Since May 26, 1918, I have performed curettage, or curettage with rapid dilatation, on all patients with dacryocystitis, in dispensary or private practice. The following is a summary of these cases.

CASE REPORTS

1. Miss L. H., age 38. L. dacryocystitis. Both canaliculi had been freely slit and small probes used by another surgeon. Much mucus expressible. May 26, Thompson curettage with dilatation to T. 13. Seen September 7. Mucus no longer formed and the passage to the nostril was free, but there remained annoying stillicidium. Patient refused further treatment.

2. Mrs. E. B., age 71. Seen first March 11, 1918, with a severe hypopyon ulcer (pneumococcal) which promptly yielded to thermophore treatment. Found to have bilateral dacryocystitis. May 31, 1918, preliminary dilatation to T. 11 then curettage, with application of Tr. iodin (left). Perfect result February 21, 1919 (9 months after operation).

3. Mrs. F. E., age 67. R. dacryocystitis of several years duration. Has been treated for one year in clinic with probes, and syringing, without improvement. Typical Thompson performed June 1st. Seen last September 14th. Perfect result (no pus, no stillicidium, fluid passes freely to nostril).

4. Mrs. C. H., age 45. Thompson curettage June 6th. Immediate cessation of pus. During my absence from the city the patient returned to the clinic (August 17th) with recurrence. Nothing was done and she has not been seen since.

5. R. sac of Mrs. E. B. (Case 2). Thompson curettage June 6, 1918. Recurrence of pus June 17th. Repetition of curettage with dilatation to T. 8. Mucus can still be pressed out February 21, 1919.

6. Miss F. H., age 16. Seen first June 7, 1918. R. dacryocystitis of seven years' duration. No treatment. Thompson's curettage without dilatation. Immediate improvement. In September, small amount of mucus could be pressed out of sac. Rapid dilatation up to T. 10 with application to the sac and duct of Tr. iodin. Seen March 8, 1919, perfect result. (No pus, no stillicidium, injected fluid passes freely to nostril.)

7. Mrs. M. W., age 77. L. dacryocystitis of five years' duration. Thompson's operation without dilatation performed June 25, 1918. December 30th pus formation. Repeated Thompson and rapidly dilated up to T. 15, encountering some denuded bone. Tr. iodin applied. January 30, 1919, no pus. T. 10 passes freely. Duct smooth thruout.

8. Mrs. M. B., age 60. R. eye has watered for years, R. pus expressible. June 25, 1918, Thompson's operation. Last seen January 2, 1919. Passed T. 7 easily. No pus. A little overflow of tears when patient goes out into the wind.

Fig. 1. Lacrimal sac bur (Green).

9. B. B., male, age 63. Bilateral dacryocystitis of many years' duration. Lost vision of left eye from serpent ulcer. Thompson's operation on L. sac September 11, 1918, without dilatation. Seen March 10, 1919. No pus. Fluid passes freely to nostril.

10. R. sac of B. B. (Case 9.) Operated September 13, 1918, by Thompson's method, without dilatation. Seen March 10, 1919. Perfect result. Fluid passes to nostril.

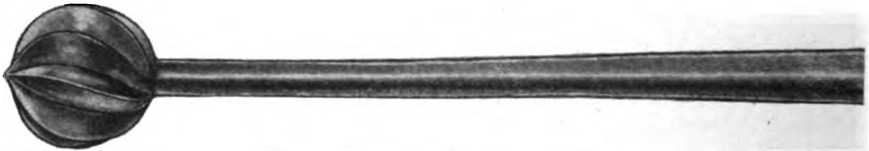


Fig. 2. Bur enlarged to show details.

11. Mrs. H. F. G., age 67. L. dacryocystitis two months' duration. September 27, 1918, Thompson's curettage. Denuded bone felt in the upper third of the nasal duct. Sac remained free from pus to November 5th, on which date a small amount could be expressed. Repeated curettage, dilated to T. 12 and applied Tr. iodin. Seen March 4th. Sac free from pus; passed T. 8 readily.

12. Mrs. J. F., age 59. R. dacryocystitis of many years' duration. Pus expressible. October 4, 1918, Thompson's operation thru upper canaliculus, using only smaller and middle sized curette. Small probe encountered denuded bone lower half of bony duct. November 9th, slight recurrence of pus formation. Repeated Thompson with rapid dilatation up to T. 13. Tr. iodin applied. December 20th, no pus, eye in fine condition. Passed T. 15 to nostril easily. Last seen January 28th. T. 12 passes easily. Duct lining smooth thruout.

13. F. L., male, age 72. Has lid scars of old trachoma with partial entropion of left lower lid. R. dacryocystitis. Curettage of sac and duct. Rapid dilatation up to T. 10 (October 14, 1918). Seen December 15, 1918. No pus expressible. Passed T. 8 easily.

14. M. H., female, age 10. L. dilated sac with purulent contents. Under general anesthesia, Thompson's curettage, rapid dilatation up to T. 10. October 23, 1918. Last seen November 30th. No pus. Fluid passes to nostril. Did not attempt to probe. (Letter from grandmother states that pus has recurred. March 10, 1919).

15. D. L., male, age 13. A half-witted child. Bilateral dacryocystitis beginning at age of 4. Right sac had been extirpated by another surgeon. Left duct had been probed, with no improvement. Greatly dilated left sac containing large quantity of pus. November 14th, Thompson's curettage with rapid dilatation up to T. 14. Denuded bone felt. November 25th, pus not expressible. Permitted to return to home in country. Four weeks later recurrence of pus. Father, given the choice of repetition of curettage and destruction of the sac by Gifford's method, chose the latter. January 7th. Seen March 10, 1919. Good result, but considerable overflow of tears.

16. Mrs. E. H., aged 64. Seen November 21, 1918. History, left eye watering many years. Pus expressible.

Thompson's operation without dilatation. December 14th, slight recurrence of pus. Used dichloramine-T ½%. December 26th, pus continues. Theobald 8 passed, encountering denuded bone. Repeated Thompson, rapidly dilated up to T. 16 and applied Tr. iodin. January 2, 1919, no pus. T. 10 passed easily to nostril. February 7th, no pus. T. 10 easily passed duct smooth thruout.

Of these sixteen cases, ten yielded first class results(no discharge, free drainage and moderate stillicidium or none). Three were improved (no pus but a small amount of mucus expressible), and three were failures. It is interesting to note that of the latter two were children.

The operation is not proposed for tuberculosis or syphilitic disease of the tear sac. In these cases, nothing less than complete extirpation with appropriate general treatment will suffice. I have had no opportunity of trying curettage in trachoma of the sac. The efficacy of various abrasive methods in palpebral trachoma would lead one to infer that a method similar in principle should be useful in ridding the sac of trachomatous granulations. Objection has been raised to curettage on the assumption that it destroys the mucosa and hence must lead sooner or later to cicatricial atresia of the duct, and the comparison has been made between curettage of the nasal end of the Eustachian tube and the procedure under discussion. But the analogy is not perfect: in the former case the curettage is deep and vigorous in order to destroy the mucosa and insure cicatricial stenosis of the nasal end of the tube: in the latter, the curettage is superficial and as gentle as possible. All evidence points to a regeneration rather than a destruction of mucosa.

The only drawbacks that I have observed are (1) a tendency of the canaliculus to become narrow at its junction with the sac—readily overcome by dilatation—and (2) a moderate stillicidium in cold and wind. This was present in about one-third of my cases and should be ascribed to the interference with capillarity due to the slit canaliculus and not to the curettage.

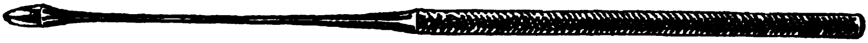


Fig. 3. Lacrimal sac reamer (Green).

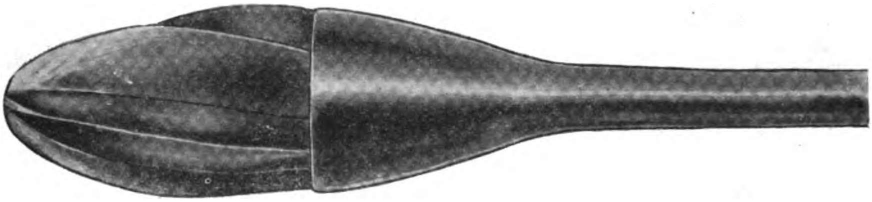


Fig. 4. Reamer enlarged to show details.

Conclusions: The combined operation of curettage followed by immediate rapid dilatation possesses many advantages.

1. It removes any foreign material that may have lodged in the canaliculi, lacrimal sac and bony duct.
2. If polypi or granulation tissue are present in any part of the lacrimonasal duct, they are effectually removed.
3. Thus prepared, the duct readily admits large probes (T. 11 or 12) and can be dilated up to T. 13, 14, 15 or 16 at the first sitting, thus insuring adequate primary and secondary drainage.
4. The application of Tr. iodin to the mucous surface sterilizes it and stimulates it to normal activity and regeneration.
5. If pus should reform, the operation can be readily repeated.
6. It is an "office" or "outpatient" operation and is often successful even when the patient cannot return for subsequent observation and probing.
7. Should this method fail, the sac can be extirpated or destroyed as readily as if no operation had been performed.
8. In my opinion, this operation will give relief in many cases of dacryocysti-

tis which have hitherto been condemned to extirpation of the sac. As it offers the chance of efficient drainage thru the natural passage, it should be preferred to any endonasal operation.

Since this paper was written, I have had V. Mueller & Co., Chicago, make, according to original designs, a set of lacrimal burs and reamers. The purpose of these instruments is to remove any foreign material or inflammatory products from the sac and duct, with a minimum of damage to the diseased mucosa. The set consists of four instruments:

1. Lacrimal sac bur. Fig. 1, and Fig. 2.

A small round boss bearing curved ridges after the manner of a dental bur is mounted on a slightly flexible shaft. The boss is 2.3 mm. in diameter (No. 7 French scale). After introduction through the slit canaliculus, the handle is twirled in the fingers, thus causing the bur to rotate in contact with the mucous membrane. The direction of the handle is altered to insure that all portions of the sac shall be curetted.

The instrument may also be used in the bony duct after the manner of the lacrimal duct reamer.

2. Lacrimal sac and duct applicator. This instrument is similar in all respects to No. 1, but is made of hard oxidized silver. It will hold a wisp of tightly wound cotton securely, and, being made of silver, will not rust when brought into contact with Tr. Iodin.

3. Lacrimal sac reamer. Fig. 3, and Fig 4.

This instrument is similar to a dental reamer, but is made shorter and with a rounded blunt end. It is mounted on a slightly flexible shaft. It has five curved ridges so sloped that when the handle is rotated, the forward passage of the instrument is facilitated. Its action is similar to that of a corkscrew. The diameter of the reamer proper is 3 mm. corresponding to No. 9 French Scale.

4. Is similar in all respects to No. 3, but is 3.2 mm. in diameter, corresponding to No. 11 French Scale. The reamers are used in a manner precisely similar to the use of Buck's curettes as described in the text.

REFERENCES.

1. Theobald. The Use of Large Probes in the Treatment of Strictures of the Nasal Duct. Trans. of the Medical and Chirurgical Faculty of Maryland, 1877, p. 154.
2. Discussion Wm. B. Chamberlain's paper—The Endonasal Operation on the Lacrimal Sac. Trans. Sec. on Ophthal, A. M. A., 1917, p. 177.
3. Chamberlain. Trans. Sec. on Ophthal., A. M. A., 1917, p. 177
4. W. R. Thompson. The Rational Etiology and Satisfactory Treatment of Dacryocystitis. Trans. Sec. on Ophth., A. M. A., 1918, p. 78.
5. Weeks. A Treatise on Diseases of the Eye, 1910, p. 201.
6. Ziegler. Trans. Sec. on Ophth., A. M. A., 1910, p. 91.
7. Fergus Ophthalmic Review, Vol. 30, 1911, p. 231.
8. Landolt and Gygax. Ophthalmological Therapeutics, 1898, p. 44.
9. Ziegler. The Radical Treatment of Lacrimonasal Disease by Rapid Dilatation and Allied Measures. Trans. Sec. on Ophthalmology, A. M. A., 1919. p. 77-94.
10. Verhoeff. Journal A. M. A., LX., 1913, p. 727.

RECURRENT SPONTANEOUS RETINAL HEMORRHAGE OF PROBABLE TUBERCULAR ORIGIN

ROBERT H. BUCK, M. D.

CHICAGO, ILLINOIS.

This paper discusses a disease entity occurring in the young, with definite symptomatology and clinical course and generally unfavorable prognosis; and reports a typical case in which hemorrhage in the left eye was followed by retinitis proliferans, new blood vessel formation in the vitreous, complete detachment of the retina, and total blindness. In spite of repeated hemorrhages, the right eye still retains 20/15 central vision but with much restricted visual fields and a few vitreous opacities, more than a year after the recurrence of the last hemorrhage.

A perusal of the literature on the subject of vitreous hemorrhages impels one to recognize that among all these cases of varying etiology, there are quite a number evidently due to tubercular involvement of the retinal vessels, more especially the veins, which have a definite symptom complex in common; and it is to the consideration of this group of cases I mean to confine this article

Among predisposing causes may be mentioned sudden changes of temperature, exposure to cold and wet, malnutrition, hereditary diseases and tendencies, anemia, vascular disease, premature development, menstrual disturbances, and undue sexual excitement and abuse. (Gehrung 1.) To these may be added constipation, indigestion, worry, great mental effort, and hereditary tubercular tendency.

Tuberculosis has never been absolutely demonstrated to be the etiologic factor in these cases, however, the observations and investigations of numerous ophthalmologists furnish very convincing evidence of the probable presence of tuberculous germs and toxins in the many cases reported in the literature.

The attention of the profession was first directed to tuberculosis as a probable etiologic element in vitreous hemorrhage in an article by Manz (2) published in 1890. These observations were supported in 1897 in an article by Weeks (3). Following this the literature contains many articles and case reports on the subject, among which are those by Noll (4), Kyrieleis (5), Knies (6), Axenfeld (7), Knapp (8), Cords (9), Igersheimer (10), Fleischer (11), Oloff (12), Friedenwald (13), Otori (14), Jackson (15), Davis (16), Agricola and Thies (17), Mayou (18), Spencer (19), Fuchs: Duane (20), de Schweinitz (21), Roemer (22), Collins and Mayou (23), Parsons (24) and F. Park Lewis (25).

Spencer in his article reports thirty-two cases in which diagnosis of tuberculosis was made, in most instances by the tuberculin reaction. This number includes three of his own, in one of which the patient also had pulmonary tuberculosis.

In two cases reported by Igersheimer the patients were also afflicted with pulmonary tuberculosis, while one of Axenfeld's cases had numerous tubercular lesions in other parts of the body.

In a case of Fleischer's in which enucleation was performed, "the retinal veins were found filled with tuberculous debris."

The reports of two cases by Otori, are of unusual interest in that in each case the eye was later enucleated because of inflammatory conditions of the iris. Pathologic examinations revealed extensive destruction of the retina, and in each case he was able to positively demonstrate tubercular germs in the retinal tissue. He considered the one case a primary tubercular retinitis and the other secondary to tubercular involvement of the nerve head.

According to the observations of Fuchs, Schoeffels and others, the beginning process is a perivasculitis along the course of the veins, which microscopically shows a round, giant and epithelial cell infiltration.

Owing to the fact that the condition primarily involves the perivascular tissue rather than the vessels themselves, it would seem that the bacilli do not gain access thru the blood-vessels, and

Mayou is of the opinion that the infection travels along the nerve-sheaths. This opinion is also concurred in by Parsons who believes that the infection travels along the lymph stream within the nerve sheath.

Later, as the vessel walls become eroded, hemorrhages occur into the vitreous, or between the retina and the hyaloid, producing the so-called subhyaloid hemorrhages. Organization of the clots results in the formation of dense fibrous masses which become adherent to the retina and produce a condition known as retinitis proliferans.

Contraction of these fibrous bands results in a detachment of the retina, and the subretinal space fills with a thin straw-colored fluid. There is also new blood vessel formation in the vitreous and the retina shows areas of necrosis and degeneration.

Epistaxis is often a forerunner of the disturbance and it has been noted in several instances that cessation of the epistaxis marked the occurrence of hemorrhage into the vitreous. For this reason Kyrieleis recommended venesection and even ligation of the carotid on the affected side.

Systemic symptoms are usually absent altho as noted, in some instances, tubercular lesions were found to coexist in other parts of the body. Blood-pressure and coagulation time are usually normal.

The patient presents himself complaining of spots before the eyes, sometimes merely black specks and at others spots of a reddish color. Generally within a few days hemorrhages occur into the vitreous or between the retina and hyaloid. These hemorrhages may be brought on by a fit of coughing or sneezing, by blowing the nose violently or following violent exercise such as playing games, dancing or laborious effort. They may, however, occur spontaneously and in spite of all precautions. The occurrence of hemorrhage is accompanied by peculiar sensations within the eye, hardly severe enough to be designated as pain, but the patient is cognizant of some unusual sensation within the eye-ball. Simultaneously there is a dimming of vision or a limitation of the visual field, and if the hemorrhage is large, the vision may be completely obscured.

In the early stages the central vision is usually not reduced, as the affection is prone to follow the course of the vessels and hence the macula is spared. If opacities are very abundant or if the hemorrhage intercepts the visual axis, there is, per se, a corresponding diminution of the central vision.

Scotomata corresponding to the affected areas of the retina are found even early in the disease and are of considerable diagnostic importance. As the degeneration advances, the visual fields diminish concentrically, the color fields for green and red showing even more rapid reduction than the general field.

External examination may or may not reveal evidences of the trouble within, depending upon the secondary involvement of these parts. Early in the course of the disease there is not likely to be any external evidence of the retinal disturbance but as the condition advances a slight circumcorneal and ciliary injection may be noted, especially just preceding and following the occurrence of hemorrhage. The tension remains normal until hemorrhage occurs when, if the hemorrhage is large, it is slightly higher.

The ophthalmoscope reveals the presence of flaky opacities in the vitreous. The disk may be sharply outlined or present a fuzzy appearance around its margins. The vessels are normal in size and proportions, but the veins are paralleled by broad white bands. As the condition progresses, small hemorrhages proceeding from the veins are observed either subhyaloid, in which case they present a sheet-like appearance, or directly into the vitreous. While the first hemorrhages are usually small, this condition does not always obtain; and in some cases the first rupture of the vessel walls may result in a very extensive outpouring of blood, even to the extent of completely obscuring the view of the fundus.

A subhyaloid hemorrhage of any great extent presents a characteristic picture in that the upper border forms a straight line across the fundus.

A striking characteristic of this disease and one that might be considered almost pathognomonic is the rapidity with which even quite extensive extravasations of blood are absorbed, in contradistinction to that of other intraocular hemorrhages which is discouragingly slow. The absorbtion is often complete, or so nearly so that only a small whitish opacity remains.

The retina shows white patches of degeneration especially along the course of the vessels and there is more or less retinal edema. The macular region remains remarkably free from the disturbance.

When the hemorrhage has been of considerable size, the resultant clot gradually loses its pigment, becoming whitish and assuming the appearance of a fibrous band extending across the fundus, the ends of which are attached to the retina by a fan-shaped structure of fine fibrous strands, leading one to believe that the entire structure was primarily an outgrowth of the retina; hence, no doubt, the name retinitis proliferans, which has been given to this condition.

As this band usually crosses the center of the vitreous, the macula and disc are often obscured. New blood-vessel formation is seen in the vitreous altho the mass itself has but a poor blood supply.

Contraction of this band of fibrous material may eventually result in detachment of the retina, the process beginning at the point of attachment of the band to the retina and extending quite rapidly until the detachment is complete from the disc margins to the ora serrata.

The accompanying epistaxis is to be taken into consideration in making a diagnosis and the marked tendency to recurrence and the rapidity with which the hemorrhage resorbs are characteristic.

Vitreous opacities and scotomata which, as the condition progresses, result in limitation of the visual fields and total blindness are added diagnostic features.

The diagnosis of tubercular infection rests practically wholly on the tuberculin reaction and this has proven positive in many of the cases reported. The test can be considered merely confirmatory, however, as coexistent tubercular localizations in other parts of the body may render the test positive; it is in itself too far from infallible to be relied upon

As the patient is not likely to appreciate the connection between indiscretions of a general nature and the local condition in the eye, a careful history is of prime importance to ascertain the predisposing causes. The importance of the correction of such elements and the establishment of a proper hygienic regimen should be thoroly impressed upon the patient at the outset and he is to be made to understand that there can be no relaxation of these precautionary measures. Residence in the country with moderate outdoor exercise and nourishing food, especially eggs and milk, will prove of great benefit.

Injections of normal horse serum and of human serum have been tried, but the results have not been such as to warrant placing much confidence in them. However, they should be tried, especially on the occurrence of a hemorrhage.

Since the tuberculin reaction is found to be positive, the use of tuberculin for its therapeutic effect is indicated, and in fact it is probably the most potent single therapeutic measure so far available. Calcium lactate, adrenalin chloride and gelatin have all been used and may have some therapeutic value.

When hemorrhage occurs the patient should be confined to bed in an absolutely quiet darkened room. The head should be raised and cold applications made to the eyes and head. Injections of serum at this time may be of some value. Catharsis should be instituted and sweating produced by the hot bath, hot pack or pilocarpin.

To promote the resorption of the clot, pilocarpin sweats, Turkish baths, and potassium iodid and sodium salicylat may be used. Locally the condition should be treated with atropin and dionin.

The prognosis of the trouble is decidedly unfavorable, altho under careful observation and treatment the vision may be preserved for some time, especially if the patient can be placed in ideal surroundings with a close observance of proper hygienic regimen.

When retinitis proliferans supervenes, the condition is not amenable to further treatment and may progress to complete retinal detachment and consequent total blindness.

Case: T. M. C., age 21, single, salesman. Came under my care April 6th, 1917, complaining of loss of vision in the left eye and floaters before the right.

Family history: Father 64, mother 50, two sisters and one brother all in good health. No eye or specific trouble in the family. Mother's two sisters and one brother died of tuberculosis.

Personal history: Ordinary diseases of childhood, also pneumonia at six years of age. Tonsillitis for six years, tonsillectomy being performed in 1915 in hope of relieving trouble in left eye. At the same time turbinectomy was performed on both sides; and some teeth extracted after x-ray had revealed the presence of abscess. Denies having had specific venereal trouble. Does not drink alcoholics and uses tobacco only moderately. He is, however, given to excessive sexual indulgence and this may have been an important etiologic factor.

He states that in August, 1915, he awoke one morning with a peculiar sensation in his left eye. He went to an oculist who pronounced the trouble neuroretinitis. Two days later he had an intraocular hemorrhage which resulted in practically total loss of vision. About two weeks later, hemorrhages recurred and eventually became organized so that he never again regained his vision.

In spite of several negative blood Wassermanns and lack of luetic history either of inherited or acquired syphilis, he was put on antispecific treatment without beneficial results.

Physical examination: Weight 145 lbs. Height 5 ft. 8 in. General appearance, fairly well nourished, nervous temperament, but not manifestly so.

Chest: Lungs, rales in lower left lobe.

Heart: Rate 65, tones regular.

Blood-pressure: Systolic 102 mm. Hg. Diastolic 82 mm. Hg.

Blood-examination: Coagulation normal. Hemoglobin 78 per cent. Erythrocytes 4,387,000. Leucocytes 8,850.

Spinal fluid was taken but technic of Wassermann test was faulty so that no reliance could be placed in the finding.

April 6, 1917. Ocular examination. V. R. E. 20/30, 20/20 with plus .75 cyl. axis 90. V. L. E. Light perception. Fields normal for right eye. Tension normal. No conjunctival reaction.

Ophthalmoscope. R. E. Dust-like opacities in the vitreous with perivasculitis along course of large superior and inferior temporal veins.

L. E. Typical picture of retinitis proliferans, a broad bluish-white band extending diagonally across the fundus from the superior nasal to the inferior temporal quadrant, and practically completely covering the disc. The central portion was dense and fibrous while the ends were spread out fan-shaped and were thinner and granular in appearance. No blood-vessels were visible in the mass, but the retinal vessels could be distinctly seen running under it.

On April 15, 1917, the patient was brought to the office with only light perception in each eye. The ophthalmoscope revealed a large hemorrhage in the vitreous of the right eye, apparently coming from the superior temporal vein.

He was given an injection of coagulose at once, which was repeated a few days later, and ordered to take large quantities of gelatin, five grains each t. i. d. of calcium chlorid and potassium iodid, and a daily sweat by means of a Turkish bath.

Tuberculin injections were begun and were kept up with increasing dosage and lengthened interval for the next six months.

Within a week the eye had cleared markedly and on April 28, two weeks after the occurrence of the hemorrhage, the vision was again 20/25 in the right eye altho a large black clot was plainly visible floating freely in the vitreous.

The same night a second hemorrhage occurred, again reducing the vision to light perception. The vitreous now contained a large clot completely obscuring the fundus. The same treatment was used and in about two weeks the vision was again 20/25.

In July, 1917, another hemorrhage of less severity occurred and the same treatment was repeated with equally gratifying results, so that in about one month the vision had again returned to 20/25.

At this time the patient was in rather poor health and was coughing a good deal, hence another pulmonary examination was made which, however, did not reveal anything definite, altho tuberculosis was suspected.

He was advised to seek out-of-door employment and severely admonished regarding sexual indulgences. Following this advice he soon regained his former health and his general appearance and weight improved.

In October, 1917, examination of the left or blind eye revealed detachment of the retina which had been progressing gradually for several weeks, and the fibrous band seemed to have broken up into numerous small pieces which were scattered thruout the vitreous.

On May 1, 1918, the vision in the right eye was 20/15 with a plus 0.75 cyl. axis 90°. He has had no new hemorrhages since July, 1917, about ten months, opacities are still present in the vitreous including the remnants of the large hemorrhages which are to be seen in the lower part of the globe. The vessels of the superior temporal quadrant and those just below the disc, still show scars of the perivasculitis and retinitis.

The visual field is limited to 30 degrees above and below, 20 degrees to the nasal side and 60 degrees to the temporal side. The fields for red and green are limited to ten degrees in all directions.

The left eye is totally blind, there is complete detachment of the retina, and and the vitreous is filled with organized material containing new blood-vessel formations.

E. A. Davis (16) gives a report of a case which bears a remarkable similarity to my own, in which he used a very similar line of treatment but with rather discouraging results. The ultimate outcome of his case was complete blindness in the right eye and only fingers at 10 ft. in the left. I only recently found this report hence my treatment was worked out entirely independently, so that I was unable to avail myself of much of his valuable experience.

At the present time, Oct. 18, 1919, patient has 20/25 vision with a very cloudy vitreous.

BIBLIOGRAPHY

1. Gehrung. Practical Medical Series., Ophthalmic, vol. p. 117, 1910.
2. Manz. Zehender's Klin. Monatsbl. p. 63, 1890.
3. Weeks. Trans. Amer. Ophth. Soc., p. 158, 1897.
4. Noll. Zeitschr. f. Augenheilk. p. 548, 1908.
5. Kyrieleis. Klin. Monatsbl. f. Augenheilk. p. 513, 1908.
6. Knies. Relation of Diseases of Eye to General Diseases, p. 402.
7. Axenfeld and Stock. Klin. Monatsbl. f. Augenheilk, Jan. 1911.
8. Knapp. Archiv f. Augenheilk. 75 p. 259. Amer. Ophth. Soc. 13 p. 486.
9. Amer. Ophth. Soc. 13 p. 486.
10. Igersheimer. Graefe's Arch. f. Ophth. 82 p. 215.
11. Fleischer. Klin. Monatsbl. f. Augenheilk. p. 245, Aug. 1913.
12. Oloff. München. med. Wochenscher. 61 p. 1103. Clin. Opht. 20 p. 661. Jour. A. M. A. 62 p. 2054.
13. Friedenwald. Trans. Amer. Ophth. Soc. 13 p. 819.
14. Otori. Arch. f. Augenheilk. 79 p. 44.
15. Jackson. Ophthalmic Record, Jan. 1916. Amer. Ophth. Soc. 14, p. 577.
16 Davis. Trans. Amer. Ophth. Soc. Vol. XIII, Part 1, 1912.
17. Agricola and Thies. Klin. Monatsbl. f. Augenheilk. Jan. 1913.
18. Mayou. Trans. Ophthal. Soc. U. Kingdom, 34, p. 180.
19. Spencer. Trans. Amer. Acad. of Ophthalmology and Oto-Laryngology. 1916, p. 60.
20. Fuchs, Duane. Textbook of Ophth. 5th Edit. pp. 562, 573, 582.
21. de Schweinitz. Diseases of the Eye, 8th Edit., pp. 418, 440.
22. Roemer: Foster. Textbook of Ophth., pp. 411, 740.
23. Collins, Mayou. System of Ophth. Practice, Pyle p. 403.
24. Parsons. Path. of the Eye.
25. F. Park Lewis. Jour. A. M. A., June 15, 1918.

CAUSES OF BLINDNESS IN EGYPT

Arthur F. MacCallan, M. D.

Cairo, Egypt

These statistical tables based upon official hospital reports give the most accurate idea of the prevalence of blindness in Egypt, and its common causes.

During the year 1918 we examined nearly nine thousand (8969) patients who were blind in one eye and more than four thousand (4261) who were blind in both eyes. (Table I.) This means that more than four and a half (4.7) per cent of all the patients were blind in both eyes and ten per cent (9.9) in one eye.

Of course we depend on the hearty coöperation of all surgeons but especially of the principal medical officers in recording all cases of blindness.

Table I. Blindness.

Year		Total No. of patients examined	One Eye No.	One Eye %	Both Eyes No.	Both Eyes %	One Eye and Both Eyes No.	One Eye and Both Eyes %
1906	....	40,103	1,297	3.2	633	1.6	1,960	4.9
1907	....	24,416	1,450	5.9	697	2.8	2,147	8.7
1908	....	19,614	1,189	6.0	852	4.3	2,041	10.4
1909	....	22,373	2,116	9.4	1,385	6.1	3,501	15.6
1910	....	25,506	2,438	9.5	2,010	7.8	4,448	17.4
1911	....	31,274	3,196	10.2	2,811	8.9	6,007	19.2
1912	....	43,668	4,115	9.4	2,824	6.4	6,939	15.8
1913	....	62,233	5,360	8.6	3,878	6.2	9,238	14.8
1914	....	75,398	6,425	8.5	3,591	4.7	10,016	13.2
1915	....	71,930	5,637	7.8	2,992	4.2	8,629	12.0
1916	....	94,447	7,042	7.4	3,504	3.7	10,546	11.2
1917	....	100,410	9,385	9.3	4,611	4.6	13,996	13.9
1918	....	90,668	8,969	9.9	4,261	4.7	13,230	14.6
Total..		702,040	58,619	8.3	34,079	4.9	92,698	13.2

The definition of blindness adopted at the Egyptian Ophthalmic Hospitals is inability to count fingers held up at a distance of one metre from the patient.

In the following table are shown the percentage of cases examined who are blind in one or both eyes at the various hospitals. (Table II.)

This percentage is seen to vary from twenty per cent at Minia (20.6) and Assiut (20.2) to seven per cent at Faraskur (7.2). There is no doubt that the higher rate is significant of great care and industry on the part of the principal medical officer.

The age at which patients became blind is of great importance for any study of the prophylaxis of blindness and of the diseases which lead to it.

Of patients under one year of age only about one and a half per cent (1.42) were found to be blind of one eye; from one year to five years, three and a quarter per cent (3.29); from six to ten years, four and a quarter per cent (4.33); from eleven to fifteen years, five and a half per cent (5.56);

Table II. Total Percentage of Blindness in One or Both Eyes.

	1914 %	1915 %	1916 %	1917 %	1918 %
Permanent Hospitals:					
Tanta	11.	8.1	5.3	9.2	8.8
Assiut	14.2	10.1	11.7	18.4	20.2
Mansura	18.6	15.3	16.6	13.2	13.9
Beni Suef	16.7	16.3	13.2	16.0	16.9
Zagazig	15.9	11.1	9.3	15.0	15.9
Damanhûr	16.8	11.4	11.8	13.5	12.9
Shebin El Kôm.....	18.5	11.9	11.8	10.2	12.3
Sohag	19.7	15.3	14.3	14.03	14.7
Minia	...	22.06	20.7	30.7	20.6
Fayûm	...	...	11.06	13.0	18.2
Mahalla El Kubra..	13.6	16.4	17.03	12.2	12.3
Kafr El Zayat.....	7.8	10.5	8.3	12.6	10.1
Santa	...	...	10.06	13.7	14.2
Traveling Hospitals:					
No. I. Camp—					
Shebin El Kanatir..	21.7	11.8	...	...	...
Min a El Qamh....	15.0	...	...	...	...
Kafr El Dauwâr....	...	...	12.7	11.9	...
Qena	...	...	...	20.5	18.3
Benha	...	...	...	10.7	...
Alexandria	...	...	...	...	15.0
Aswân	...	...	...	...	12.8
No. II. Camp—					
Maghagha	22.9	...	...	...	...
Damietta	9.6	...	...	...	...
Barrage	...	5.8	...	...	...
Giza	...	...	10.5	12.6	11.1
Rosetta	...	...	...	15.7	...
Fûa	...	...	...	12.6	...
Embaba	...	...	...	...	15.6
No. III. Camp—					
Barrage	...	...	...	...	15.6
Assiût P. C.—					
Manfalût	5.3	6.7	...	8.9	14.7
Manfalût	8.3	...	...	...	...
Deirût	7.4	...	...	6.4	12.3
Mallawi	5.6	...	6.1	8.2	...
Abnûb	...	...	4.1	...	...
Abu Tig	...	...	...	9.6	...
Daqahlia P. C.—					
Mit Ghamr	16.5	4.7	7.9	...	8.2
Mataria	8.6	...	...	...	...
Dekernes	11.2	...	...	10.6	...
Faraskûr	...	...	7.1	...	7.2
Aga	...	...	...	22.3	14.2
Simbellawein	...	...	...	10.7	...

Table III. Blindness in One or Both Eyes per Age During 1918.

Hospitals	Under 1 year	From 1 to 5	From 6 to 10	From 11 to 15	From 16 to 20	From 21 to 40	Over 40 years	Total
No. 1 Camp...	3	23	54	65	50	361	630	1,186
No. 2 Camp...	5	37	41	59	78	476	329	1,025
No. 3 Camp...	1	3	8	8	8	57	57	142
Tanta	19	35	43	31	40	231	237	636
Assiut	26	43	68	47	78	526	553	1,341
Mansura	4	59	33	64	35	331	246	772
Beni Suef	5	20	25	76	81	352	319	878
Zagazig	4	22	28	61	55	360	269	799
Damanhour ...	9	29	26	16	38	317	183	618
Shebin El Kom	13	22	28	42	65	268	208	646
Sohag	2	27	28	35	45	230	253	620
Minia	12	21	28	40	53	533	362	1,049
Faywa	35	23	42	43	66	391	493	1,093
Mahalla Kubra.	10	19	11	20	20	124	176	380
Kafr El Zayat..	9	14	13	12	12	189	53	302
Santa	12	8	13	19	17	147	194	410
Assiut P. C...	17	17	48	75	25	366	411	959
Daqahlia P. C.	3	14	36	23	28	113	147	374
Total.......	189	436	573	736	804	5,372	5,120	13,230

from sixteen to twenty years, six per cent (6.07); from twenty-one to forty years, forty and a half per cent (40.6); over forty years, thirty-eight and a half per cent (38.7). It is therefore a fact either that the majority of the blindness occurs after the age of twenty-one years or that the blind among the younger patients are not brought to the hospitals.

Table IV. Percentage of Blindness in One or Both Eyes per Age During 1918.

	Per cent of total examined.	Per cent of total blind.	Per cent of patients of this age.
Under 1 year	.21	1.42	2.93
From 1 to 5 years	.48	3.29	5.06
From 6 to 10 years	.63	4.33	6.21
From 11 to 15 years	.81	5.56	8.57
From 16 to 20 years	.88	6.07	11.77
From 21 to 40 years	5.92	40.60	19.96
Over 40 years	5.64	38.70	32.30

The average blindness being thirteen per cent (13.2), the small amount of blindness found among the patients up to the age of fifteen years (three to eight per cent) is remarkable. It is not until after the age of twenty-one years that the incidence rises sufficiently to produce the average of thirteen per cent.

The deduction to be drawn from this apparently is that the danger of blindness is vastly increased with the onset of years, and that this increases progressively from birth onwards. Incidentally it may be noted that ophthalmia neonatorum is extremely rare among Egyptians.

The ages of all patients treated may be of interest and these are given in the following table:

From an examination of the ages of all the patients treated we find that about eight per cent were under one year, ten and a half per cent from one to five years, eleven per cent from six to ten years, ten per cent from eleven to fifteen years, eight per cent from sixteen to twenty years, thirty-two and a half per cent between twenty-one and forty years and nineteen per cent over forty years. It is therefore evident that some children are brought to the hospital.

Table V. Patients Treated per Age During 1918.

	No.	Per cent
Under 1 year	6,434	7.81
From 1 to 5 years	8,607	10.45
From 6 to 10 years	9,213	11.19
From 11 to 15 years	8,483	10.30
From 16 to 20 years	6,826	8.29
From 21 to 40 years	26,904	32.68
Over 40 years	15,849	19.25
Total	82,316	

To determine the cause of the increased liability to blindness with advancing age requires a study of the prime pathologic causes of blindness which are noted below.

From this it is seen that altho cataract (7.72 per cent) and glaucoma (10.96 per cent) account for a considerable amount of blindness found, the main cause is conjunctivitis (73.39 per cent) of all kinds, resulting in total corneal opacity, shrunken globe, secondary glaucoma and various other conditions unspecified in the statistics.

We come back to acute conjunctivitis as the most important cause of blindness. Trachomatous conjunctivitis is as you are well aware a chronic disease and does not frequently of itself produce blindness.

The amount of blindness due to glaucoma is noteworthy, more than one and a half per cent (1.62 per cent) of all the patients who seek treatment at the ophthalmic hospitals being blind from this disease.

Table VI. Causes of Blindness.

	1912	1913	1914	1915	1916	1917	1918	Total	%
Congenital	11	12	10	7	3	4	8	55	.06
Acquired:									
Conjunctivitis resulting in:									
a. Total corneal opacity	2,109	2,553	3,170	2,759	2,861	3,665	3,569	20,686	24.15
b. Shrunken globe	1,933	2,647	2,857	2,317	3,109	3.923	3,713	20,499	23.93
c. Secondary glaucoma	1,630	2,070	1,977	1,815	2,032	2,498	2,480	14,502	16.93
d. Other conditions	635	787	1,094	745	859	1,577	1.483	7,180	8.38
Fundus:									
Optic atrophy	151	100	119	90	145	178	195	978	1.14
Retinitis pigmentosa	20	29	19	12	23	22	24	149	.17
Various	203	305	184	182	152	254	194	1,474	1.72
Glaucoma absolutum:									
Monocular	536	553	638	657	695	893	751	4,724	5.51
Binocular	562	651	513	650	673	903	720	4,672	5.45
Cataract	486	930	862	797	1,053	1,201	1,287	6,616	7.72
Injury	47	63	47	70	56	148	92	523	.61
Operation	25	23	19	17	32	52	34	202	.23
Infectious diseases	4	27	19	19	2	32	11	114	.13
Iritis endogenous	184	224	165	94	160	277	209	1,313	1.53
Various	67	387	262	230	241	422	331	1,940	2.26
Total	8,603	11,361	11,955	10,461	12,097	16,049	15,101	85,627	

A NEW OPERATION FOR THE RELIEF OF CONICAL CORNEA

L. Webster Fox, M. D., LL.D.

Philadelphia.

This paper was presented at the meeting of the Section on Ophthalmology of the American Medical Association, June 1919. It is published here thru the courtesy of the Journal, A. M. A.

In a previous communication concerning the history and evolution of the treatment of conical cornea,[1] I emphasized my lack of confidence in the surgical treatment of the condition as then practiced, and expressed a preference for the use of variously shaped and sized opaque disks pasted on the surface of correcting lenses worn by the patient. These were in effect artificial pupils. The later work of Dr. Meyer Wiener in regeneration of the cornea and his subsequent operation for the relief of keratoconus,[2] together with my own gratifying results in transplantation of the cornea, encouraged me in the belief in the great reparative powers of the cornea and inspired me in the experimentation along the line of surgical treatment for conical cornea. As a consequence, I have evolved a surgical procedure that has given me results far beyond my original hopes and expectations, and I present it herewith for your serious consideration.

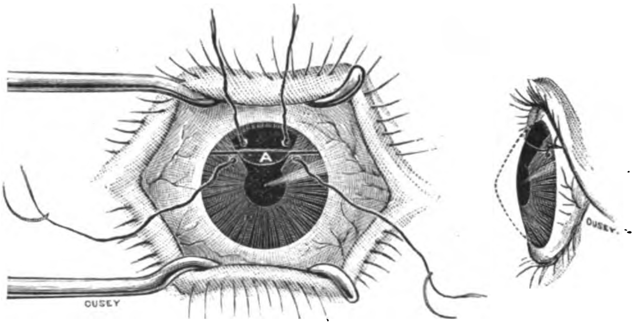


Fig. 1. Excised cornea; stitch in situ.

After preparation of the patient and the field of operation in the usual manner, the eyelids and the area surrounding the eye being thoroughly cleansed with a neutral soap, followed by a bath of benzin and alcohol, a 0.5 per cent. solution of tincture of iodin is applied, and the cocain anesthesia is produced, freshly made cocain solution being used. The eye is again irrigated with a 1:2,000 mercuric chlorid solution. Just before beginning the operation, 1 drop of atropin solution (4 grains to 1 ounce) is instilled. An eye speculum is then introduced. The conjunctiva is grasped a trifle below the inferior corneoscleral margin, slightly to the nasal side, and a Graefe knife is introduced into the cornea about 3 mm. above its horizontal meridian with the cutting edge inclined directly forward so as to bisect the cornea straight across, parallel with the horizontal meridian but above it. This requires considerable care and the exercising of good judgment, otherwise the pupillary area will be obscured by the final effects of the operation. It is better to be too high than too low. The inferior segment of the cornea is then depressed gently by the iris forceps, which are then inserted beneath the superior corneal segment so as to grasp a portion of the iris. This is then withdrawn and cut off by the de Wecker scissors. The upper margin of the inferior corneal segment is then grasped by specially constructed, small, straight, rather smooth forceps, turned slightly outward, and a semilunar strip of cornea is removed from the edge by means of small, strong scissors curved on the flat (also specially devised for this procedure, after the model of Lagrange). This strip of corneal tissue is about 2 or 3 mm. wide at its thickest portion, from 5 to 7 mm. long, and involves the entire thickness of the cornea. A fine silk suture is introduced through the adjacent edges of the original incision on either side of the pupil and then tied in the following manner: Specially constructed forceps, with an incomplete fenestrum at the end of either blade, are used to grasp the margin of the upper segment of the cornea which is thereby everted. While it is everted the needle carrying the suture is passed through the fenestra and the corneal tissue. The forceps are released, the suture being disengaged by slipping through the break in the incomplete ring at the distant extremity of the forceps. This is repeated on the other side of the pupillary area in the upper margin of the corneal incision. The sutures are then introduced in the lower segment of the cornea in a similar manner and tied. Atropin is instilled. The eye is irrigated and the usual dressing applied. There is very little reaction, as a rule, and the corneal sutures are removed at the end of eight days.

At the conclusion of the operation, the cornea is found to be materially flattened and does not regain its conical shape as convalescence progresses. There is a certain amount of scarring.

My results in ten cases from this operation have been most gratifying; in fact, the best I have ever obtained from any form of treatment for this annoying condition.

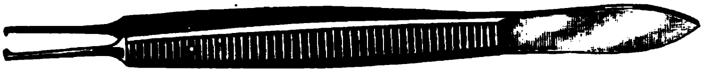


Fig. 2. Forceps for grasping cornea.

There is nothing new under the sun, and just here I take the liberty of quoting from my article on this subject,[1] in which I show the operative treatment as followed out by M. Desmarres, Bull, von Graefe, and Bader:

M. Desmarres advocated puncture of the cornea, after which light but long continued pressure should be applied. Shortly afterward Mackenzie published the statement that evacuation of the aqueous humor was of no value whatever in this condition. Division of the recti muscles in conical cornea had been suggested some time prior to 1854, but was not seriously considered. G. J. Bull's recently reported case of astigmatism, in which a cure was effected by a complete subconjunctival tenotomy of the external rectus, indicates the possibility of relief in conical cornea by this means. Fario, an Italian surgeon, produced drainage of the aqueous humor by excision of three small portions of the cornea. Vision was improved by this procedure.

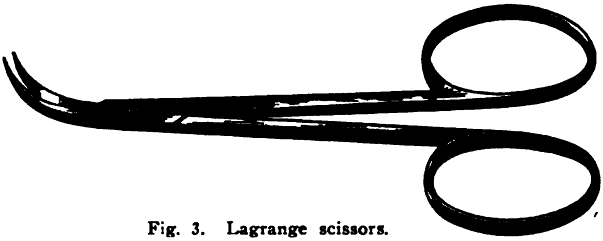


Fig. 3. Lagrange scissors.

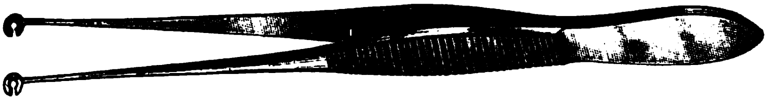


Fig. 4. Forceps with incomplete fenestrum at end of each blade.

Von Graefe, in an interesting case of

conical cornea, produced ulceration of the apex of the cone and subsequent contraction and flattening of the cicatrix. His operation consisted in passing a very small cataract knife (von Graefe model) into the middle layers of the cornea just at the apex of the cone to the extent of about one line, after which it is withdrawn; a small superficial flap is thus formed, which is seized with a very fine pair of forceps and snipped off at its base with a pair of curved scissors in order that a superficial gap may be left at this point. Great care should be exercised in entering the knife to prevent its penetration of the entire thickness of the cornea; should this occur, the operation should be postponed for a few days until the perforation closes. On the day following the operation, a finely pointed stick of mitigated silver nitrate is lightly applied to the floor of the gap and immediately neutralized by a saline solution. The application is repeated at intervals of from three to six days until a slight, faintly yellowish infiltration is formed. Atropin should be instilled and a bandage applied to guard the eye from exposure. Improvement becomes manifest only after the infiltrate undergoes contraction, and this usually requires about five or six weeks.

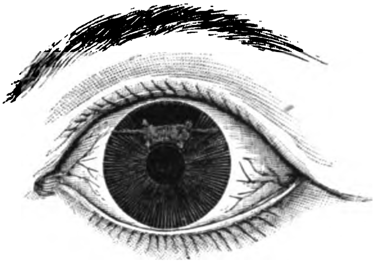


Fig. 5. Cornea after three months.

Bader reported nine cases in which a more or less flat cornea was produced by the following method of treatment: A delicate curved needle, carrying fine silk or silver wire, is passed through the cornea in its horizontal diameter close to the point of the cornea to be removed. The point of the needle is then carried horizontally across the anterior chamber and is thrust through a point of the cornea opposite to the point of entrance and close to the portion of the cornea to be removed. The needle is left in the cornea until the top of the cone has been removed, as it serves to protect the lens. The head of the needle is held in one hand and the lower half of the cone is divided with a Beer's knife, the needle is then released, the small flap seized with iris forceps, and the rest of the cone removed with scissors. The needle is then drawn completely through the cornea and the ends of the thread tied so as to unite the edges of the wound.

I wish to state that the operation I have been carrying out has improved the vision from 3/200 to 20/30 in one case; and the average vision, under the proper correction of 20/70. Then, too, I have found that as time goes on the vision continues to improve, owing, evidently, to the contraction of the cicatricial tissue, giving the cornea a more spherical shape. I shall not give my final findings until the expiration of a year or a year and a half, thus to enable the cornea to flatten as much as possible. By the end of that time the operation will be thoroughly tried out.

REFERENCES:

1. Fox, L. W. Ophthalmic Record, January, 1904.
2. Wiener, M. Jour. A. M. A. v. 69, p. 797.

EXPERIMENTS ON RABBITS WITH SALVARSAN—THERAPEUTIC AND TOXIC DOSES

LT. JOHN ARNASON JOHNSON, M. C., U. S. A.

TACOMA, WASHINGTON

These experiments are reported from Camp Lewis, American Lake, Washington. Authority to publish granted, Board of Publication, S. G. O.

Several cases of syphilis with eye symptons examined in the Eye Section of this Base Hospital and several that were seen in the repeated examination and surveys of those under luetic treatment stated that the loss of vision of which they complained dated from the administration of salvarsan. At the suggestion and under the direction of Major Harry Vanderbilt Würdemann, chief of the eye, ear, nose and throat sections, and with the collaboration of the laboratory, the writer secured a number of rabbits and subjected them to large doses of salvarsan during the period of three months. The results of this follow:

Twelve rabbits were injected with a 1-10 salvarsan; the weight ranged 1100 Gm. to 1650 Gm. with one exception 980 Gm. The rabbits were given 1 decigram of salvarsan to a dose, excepting the three largest rabbits which were given 1.4 decigram for two doses. The salvarsan was injected into the veins of the ears.

Three of the rabbits died from the first salvarsan injection after three days. These eyegrounds were frequently examined but no changes were found. There was no postmortem examination made of these. The weight of these rabbits was 980 Gm., and 1410 Gm.

The fourth rabbit, weight 1100 Gm., died while it was getting its fifth salvarsan injection, twenty-nine days following its first injection and five days after the fourth. There had been no change in the eyegrounds noted. This rabbit was examined postmortem. The liver showed a large number of small hemorrhages, the other organs seemed normal. The brain, spinal cord, and urine were tested for arsenic and the laboratory failed to find even a trace.

The fifth rabbit, weight 1120 Gm., white, received six doses of salvarsan in thirty-four days, and then after a period of thirty-four days, it was given a final dose. The night following the second injection of salvarsan, while this rabbit was very listless, the guinea pigs ate nearly half of its right ear. The shock came very nearly proving fatal. Autopsy was held two days following final injection of salvarsan; findings were as follows: A very thin rabbit, liver showed numerous small hemorrhages, other organs were apparently normal. Urine was straw color.

The following seven rabbits, weight from 1140 Gm. to 1650 Gm., received ten injections of salvarsan in seven weeks, then they rested a month before getting the final dose. They were posted two, three, four and five days later. All the rabbits lost weight while they were given the salvarsan. During their rest period they gained a little. Rabbit No. 7 had an abscess on the back over the right kidney. Slides were made, the laboratory reported organism resembling streptococcus. Frequent examination failed to show any changes of the eyegrounds. This was corroborated by repeated ophthalmoscopic examinations by Major Würdemann.

Postmortem findings:

Liver showed more or less small hemorrhages, other organs seemed normal; the urine was a milky gray.

Following is the laboratory report by Francis B. D. Brown, 2nd Lt., M. C., U. S. A.:

Urine samples were all negative for albumin. A small amount from each sample was heated in a small size test tube until sample boiled gently. Addition of acetic acid cleared every tube showing absence of albumin.

The procedure used for arsenic is as follows:

From three to five grams of each sample was ground with a little concentrated hydrochloric acid in a porcelain mortar until pasty. More acid was added, making in all about ten to fifteen c.c. The resulting thin paste was transferred to a marked 250 c.c. Erlemeyer flask, about 3 g. of potassium chlorat, $KClO_3$, solid was added. After shaking well and standing until the foam subsided, the flask was placed on a boiling water bath and heated about twenty minutes. At intervals of about five minutes, small additions of potassium chlorat, 2 to 3 g. were made until no further change of color was observed.

After cooling, the liquid in the flask was added to a test tube containing free zinc to which a drop of copper sulphat solution had been added. A loose plug of cotton was placed in the neck of the tube to absorb any foam or splashing from the action of the acid on the zinc. A small piece of filter paper was placed over the tube and a drop of concentrated silver nitrat solution placed in the center. The presence of the arsenic is shown by the development of a lemon yellow spot on the silver nitrat paper after ten to twenty minutes. A drop of water turns the yellow spot black.

This is the Gutzeit test for arsenic and is one of the most delicate tests for this substance. It was found by separate test that .01 mg. of arsenious oxide, as 203 gave a marked yellow coloration turning dark when water was added.

CONCLUSIONS: These experiments, altho limited in number, show that these rabbits were thoroly impregnated with arsenic by the salvarsan injections. The dose of one decigram was lethal to but three; the others lived thruout the treatment and the postmortem examination showed a recovery of arsenic in the tissues examination. In none of the twelve rabbits was an optic neuritis produced. These experiments, taken in connection with the fourteen cases of optic neuritis discovered during the survey of patients before or during the treatment of syphilis in which the optic nerve lesions disappeared rapidly under salvarsan treatment, show that in these cases at least, arsenic has had no influence upon the development of an inflammation of the optic nerve; rather contrawise where neuritis had already developed, the specific treatment caused speedy resolution; thus it seems that the fear of production of blindness by therapeutic doses of salvarsan is unwarranted.

TABLE

	2 days after salvarsan injection		3 days after salvarsan injection		4 days after salvarsan injection		5 days after salvarsan injection	
	5	6	7	8	9	10	11	12
Blood	++	++	+	+	+		+	±
Brain	+	+	+	++	++	++	++	++
Spinal Cord.......				+	+	++		+
Urine	+	++	++	+++	++	++	+	+

Trace of arsenic (less than .01 mg.) +++. Faint trace, ++. Very faint trace, +.

NOTES, CASES AND INSTRUMENTS

SPONTANEOUS RUPTURE OF MORGAGNIAN CATARACT

JOSE DE JESUS GONZALEZ, M. D.

LEON GTO., MEXICO.

This report was presented to the Section on Ophthalmology of the Fifth Medical Congress of Mexico.

The extreme rarity of spontaneous rupture of hypermature soft cataract makes this case of such interest to the observer that it is worth while to relate it.

Mrs. V. G., age 75, whom I have known for more than 30 years (the dates that I relate have been verified by myself) underwent, in 1898, an operation for cataract of the right eye, with complete success. The extraction was without iridectomy and without the least operative complication. The pupil stayed round and was contractile, and the visual acuity equally normal for distance and for reading.

As she was exceedingly nervous and timid, the good result obtained in the operation made her refuse operation on the left eye, whose cataract was complete and ripe at this time.

The years went by, the nonoperated cataract underwent the regressive modification which softened the superficial layers of the crystalline lens. The color had turned to bluish white; and this color, which varied with the change of position of the patient, made one think that a hardened nucleus existed.

One morning in the year 1912, fourteen years after she was operated for cataract in the right eye, without the eye receiving any jolt, or without the patient making any hasty movement or great physical effort, she experienced a sudden and acute pain in the left eye, accompanied by intense temporal and supraorbital pain, and a sensation of vertigo, followed by nausea and vomiting.

Next day she was brought to my office. There was intense pain and photophobia, which compelled the patient to cover the operated eye. The eye showed nothing abnormal except the operative aphakia. The left eye presented severe ecchymosis and conjunctival hyperemia. The anterior chamber was completely filled with a milk-white liquid. The cornea was transparent, but with the epithelium slightly dull, as seen in an attack of acute glaucoma. The tension was much higher than normal. Of the iris nothing could be seen. The eye was painful on pressure.

The diagnosis proved not difficult: A Morgagnian cataract which had formed in the left eye had unexpectedly and without apparent reason ruptured and had emptied its contents into the anterior chamber, causing an acute glaucoma.

If we remember the investigations on the pathogenesis of glaucoma by Dr. Uribe Troncoso (1) who has found an increase of albumin in the aqueous humor in glaucomatous eyes, making the filtration difficult through the canal of Schlemm, and causing the retention of liquid and hypertension, we shall not be astonished that the sudden and abundant outpour into the anterior chamber of thick liquid, heavily albuminous, may have caused a violent attack of glaucoma.

What caused the rupture? Probably the regressive action of the crystalline layers had invaded the capsule itself and by thinning it had caused it to give way.

The natural therapeutic indication would be the extraction of the liquid, by making a straight incision large enough to facilitate extraction of the nucleus, which, according to my belief, still was present. But the timidity of the patient, the advanced age (75 years), and her excessive nervousness, and not consenting to an operation, led me to prescribe instillations of eserin and applications of dionin 5%, until an intense lymphocytosis was produced; and steaming for fifteen minutes.

The pain ceased, the tension diminished, the absorption of the liquid was more noticeable from day to day, and within two weeks the anterior chamber became free from debris; the cornea remained transparent, the iris had regained its normal appearance and the pupil its form and its reaction. But the hardened nucleus still persisted, probably the capsular rupture cicatrized, and the pupil remained obstructed, opaque as before. The light sense was preserved and she could appreciate the difference in intensity of light and its direction.

I observed the patient five years from the date of the accident until her death, which occurred this year, and she suffered no return of glaucomatous attacks; but the nucleus did not absorb.

The only case similar to the one I have just described, which I find in the ophthalmic literature, is that of Rollet and Genet, (Rev. Generale d'Ophtalm, January, 1913), under the title, "Soft Cataract ruptured spontaneously into the anterior chamber." A blacksmith, 67 years of age, whose left eye had been operated for cataract seventeen years ago, the 27th of September, 1912, suddenly developed violent headaches, accompanied by vertigo and nausea, and localized on the right side. The right eye was much injected and where formerly he could see the light, he had lost all vision. Four days after this Rollet and Genet had him under observation at the hospital of Lyons; a light liquid filled the anterior chamber of the right eye with hypertension and pain. Eserin was instilled and the eye regained slowly its normal appearance, and in a month and a half the cornea was transparent, the anterior chamber normal, the pupil myotic, due to the eserin. The ophthalmoscope showed the ocular media transparent, the iris tremulous and absence of the lens. This patient, much happier than ours, recovered his vision after the accident.

My observation has the advantage that I knew the patient and had observed her cataract, while Rollet and Genet supposed the existence of the Morgagnian cataract which ruptured.

A CASE OF TRAUMATIC PULSATING EXOPHTHALMOS

R. S. MAGEE, M. D.

TOPEKA, KANSAS

The following history of a case is presented to you because of its rarity and its unusual cause, also, because I saw it soon after its beginning, and was able to follow it thru to its completion, noting its progress as it developed.

R. C., married, aged 24, was first seen by his physician, Dr. J. S. Stewart, Summerfield, Kansas, November 20, 1917. Family history negative; always been healthy; well nourished; farmer; active and cheerful.

Went out in the evening, November 18, 1917, to do the chores. While feeding the hogs and standing near a fence, stooped over to pick up an ear of corn and in so doing was struck on the left eye by a wire which stood up straight, the other end being fastened to the ground. He was stunned, became sick and vomited, followed by headache, with a queer feeling in his head for some time afterwards, when the eye began to swell. On November 28, 1917, ten days afterward, he was brought to my office by his physician.

Examination showed no marks of an injury to the eyelids or the eyeball by the wire. Ptosis, ecchymosis of the orbital and palpebral conjunctiva; and proptosis with immobilization of the eyeball, and some dilatation of the pupil. The muscles supplied by the 3rd, 4th and 6th nerves involved. The eyeball was fixed, looking straight ahead, vision undisturbed, practically $\frac{20}{xx}$. Complained of sensitiveness to light. Potassium iodid was prescribed and the patient sent home.

Three weeks later he returned. Double vision was present, the orbital tightness had increased. Proptosis more marked, intense rigidity of all muscular movements. Increasing headache. Bulbar and palpebral conjunctival congestion had increased, extending down into the lower culdesac. Ophthalmoscopic examination showed media clear. The disc and retina showed no apparent changes. Pupil showed some dilatation, not marked, unchanged by light. The veins in the skin of the upper lid were distended and tortuous.

The color of the overlying skin had assumed a dark cyanotic hue. At this time he began to complain of whistling or blowing noises over the left temple, asking me to listen to hear the noise. Said his wife could hear it.

Did not see him again until February 12, 1918. In the interim he had gone to Omaha to see Dr. Gifford. This time when he came back he had a pressure bandage over the left common carotid (making pressure) and trying to wear it. Said the discomfort was very great. The noises in his head had increased—blowing sounds he called them. Proptosis had increased to the extent that the lids failed to cover the globe. Immobilization complete. Vision reduced to one-half or less. Photophobia had increased. Pulsation of eyeball, synchronous with the heartbeat. A distinct bruit over the globe extending to the left temporal region could be heard. A marked chemosis of the lower half of the eyeball. The cornea showed a beginning haziness and blurring.

Under general anesthesia an examination was made of the postbulbar region by separating the conjunctiva and introducing the finger and passing it well back towards the apex of the orbit. Nothing was found. The pulsation, exaggerated, could be felt with the finger in the apex of the orbit. With the assistance of Doctors W. F. Bowen and H. O. Clark, the left common carotid was exposed, and the internal carotid was ligated just above the bifurcation. Immediately the pulsation ceased. Previous to the ligation the eyeball was removed. The opening in the anterior lacerated fissure seemed greatly enlarged, admitting the face of the finger readily, showing pressure absorption, likely because of pressure of the venous channels on the walls of the bony fissure.

A critical condition followed for two weeks. He remained in the hospital for four weeks. Partial right sided hemiplegia existed for some time. Difficulty in speech continued all the time during his stay in the hospital.

He could not be raised up in bed, would swoon away and lose consciousness, and once the nurse phoned that he was dying.

At the end of four weeks he was discharged from the hospital. Two weeks after going home, wrote that he still occasionally heard the noises, but several months later said that they had disappeared entirely. The edema of the orbital tissue was very slow in disappearing, in fact, did not disappear entirely, and still interferes with the perfect fitting of the artificial eye. At times patient says that the pulsating movement is still noticeable, when the artificial eye is being worn.

The excuse for enucleation was that the integrity of the globe was endangered by the beginning keratitis, also greatly hazarded by cutting off the blood supply following ligation of the internal carotid, and the prospective blindness resulting from atrophy due to pressure, which had already taken place and would likely continue; and the doubt of the globe returning back into the orbit to resume its proper location, should the swelling subside.

I cannot give the location of the aneurysm within the brain—I do not know—only I believe that it was in or near the cavernous sinus, making pressure there on the return blood from the orbit. My patient carried an accident insurance policy and had difficulty in making settlement, due to the fact of a doubt in the minds of the company as to the cause of the trouble, whether it was due to direct violence or not.

In looking up the literature I find the report of a much similar case by Bedell[1] in 1918. The patient was down in a cellar stooping over, and quickly straightened up, struck her head in the right parietal region against a beam. The injury caused pain and dizziness for several days. The globe moved, but the internal carotid was ligated. The eye became permanently blind, the proptosis slow in recovering.

Mayou[2] reports a case caused by a fragment of shrapnel entering behind the right mastoid process. A bruit could be heard over the orbit and head and marked proptosis, with no improvement by ligation of the carotid.

Caillaud[3] reports a case of bilateral pulsating exophthalmos, due to injury from shrapnel, passing thru the maxillary sinus. Marked proptosis. Bruit could be heard on auscultation over the globe.

Augstein[4] reports a case of pulsating exophthalmos due to injury to the lower jaw. Marked proptosis. The exophthalmos and pulsation subsided following ligation of the carotids.

Key[5] reports a case of pulsating exophthalmos due to a severe blow on the side of the head. Five days after the injury first noticed a slight protrusion of the eyeball. A well defined bruit and pulsation could be heard.

Dodd[6] reports a case coming on one month after a severe blow on the side of the head. Marked proptosis.

REFERENCES:

1. Bedell. Traumatic Pulsating Exophthalmos. Amer. Jour. Ophth. v. 1, p. 311.
2. Mayou. Pulsating Exophthalmos Following a Head Wound. Tr. Ophth. Soc. United Kingdom, v. 37, p. 191.
3. Caillaud. Traumatic Bilateral, Pulsating Exophthalmos. Arch. d'Opht. v. 35, p. 746.
4. Augstein. Bilateral Pulsating Exophthalmos Caused by Bullet Wound. Klin. Monatsbl. f. Augenh. 1916, p. 484.
5. Key. Pulsating Exophthalmos. Arch. of Ophth. v. 47, p. 210.
6. Dodd. Unilateral Exophthalmos. Amer. Jour. Ophth. v. 1, p. 140.

FOREIGN BODY IN EYE NEARLY TWENTY-NINE YEARS

J. H. Buckley, M. D.
FORT SMITH, ARKANSAS

J. M., miner, sixty-two years old, consulted me July 30th, 1919, in reference to a painful eye. Tension was normal, iris appeared muddy, pupil small, pear shaped, large end toward nasal side. Hypopyon measuring four mm. across top surface and two mm. vertically through center. Scar through limbus temporal side running transversely three mm. long, one and one-half mm. in cornea, balance in sclera. Ciliary zone in neighborhood of scar slightly pink. Absolute absence of light perception in all parts of field, also absence of pupillary light reflex. I advised patient to have the eye removed; that if he did not do so, and that if he lived long enough he would lose vision in the other eye. He said, "That is what Dr. ——— told me twenty-nine years ago." I sent him to Spark's Memorial Hospital and removed the eye that day.

On September 7th, 1890, while using a hammer cutting a rail for a railroad company in Virginia, a sliver from the steel cleaver he was striking struck him in the eye. He experienced pain at interrupted intervals until after Christmas, at which time the eye became quiet, and remained reasonably so until April, 1919, when it began paining him and continued to do so until I removed it. Upon opening and inverting the enucleated eye I found imbedded in the upper anterior quadrant of the choroid a piece of steel three mm. long, one and one-half mm. wide and three-fourths mm. thick, one end being only one mm. from ciliary body. It is quite interesting and I think unusual that a foreign body remained twenty-nine years, less five weeks and three days, within an eye, without causing more pain and reaction than this did. No history of sympathetic irritation obtainable.

SOCIETY PROCEEDINGS

NETHERLANDS OPHTHALMOLOGICAL SOCIETY

FIFTY-THIRD MEETING

Utrecht, June 9th, 1918.

Translated from the Nederlandische Tijdschrift v. Geneeskunde, October 26th, 1918, by E. E. Blaauw, M. D.

Demonstration of Cases.

PROF. H. SNELLEN demonstrated a case of *Traumatic Aniridia* after injury with a tobacco box; a severe form of *Choroidal Tuberculosis,* a patient with *Optic Neuritis,* or perhaps rather *Pseudoneuritis.* Specimens were shown of an eye, which clinically had appeared as a *sarcoma,* that had proliferated from within outward, while the pathologico-anatomic examination showed an ectasia consequent on *Intraocular Tuberculosis.*

DISCUSSION.—Nicolai had seen in a patient, with headache, a monolateral typical papillitis with normal vision, which remained unchanged during 4 years; he presumed that this was not a true papillitis.

Rochat asked about the adaptation, which perhaps may show some disturbances, after Behr's investigations.

Snellen replied he had not had time for complete examination.

DR. L. H. VAN ROMUNDE demonstrated *Ophthalmoscopy* with *red free light,* after the method recommended by Vogt.

Heterochromia and Melanosis.

DR. J. P. WAARDENBURG found since his publication in 1915 (Ophthalmology, Vol. XII, p. 106), 3 more cases, which gives 0,085 per cent of his patients. Augstein found 0,050 per cent; 6 patients in 12,000.

CASE 1. Lady 43 years old, with about symmetric, nearly vertical pigment streaks at the posterior surface of the cornea. They were broadest and pigmented the thickest just below the corneal center, 2 to 2.5 mm. Towards the periphery the individual particles are well recognizable. The color of the eye was gray with some yellow pigment in the small iris circle.

CASE 2. Lady 38 years old. V. = 5/5. O. D. no changes. O. S. in the pupillary space shows pigment spots against the lens capsule, while a horizontal fine pigmented streak is seen against the posterior wall of the cornea. This streak is dark brown, sharply circumscribed, has the length of about one-third of the cornea, and is ½ mm. broad. The iris is built of coarse trabeculae and brown.

CASE 3. Lady 54 years old. V. after correction 5/10 with a slight Ast. No changes with the exception of a very slight peripheral lens opacity. Against the posterior surfaces of both corneas small pigment streaks are seen, in V form, a little below the center, of about half the length of the cornea. The principal direction is horizontal, the sides of the V are slightly bent. The iris is brown.

CASE 4. Lady 40 years old. V. with correction for each of cyl. —3.5 = 5/10. The corneas have a diameter of hardly 10 mm. They are astigmatic with a horizontal curve of 46 D. and vertical of 50.6 D. The left cornea shows a few oblique, very fine, deep opacities, in between more clear spaces; while a small central part looks as a dull window, covered with extremely fine lightly pigmented points. In O. D., the fine pigmented opacities are much more numerous; they cover the paracentral and nasal side of the cornea entirely. The iris is blue gray with orange yellow pigment in small vascular circle.

Waardenburg believes that these 4 cases have a similar cause: *Congenital Melanosis,* the result of later pigmentation of the pupillary membrane after having grown together with the cornea, after formation of the anterior chamber; because all other affections are absent, the color particles are the densest centrally; and the condition is in both eyes, while other congenital deformities, corneal opacities, microcornea and astigmatism are present.

Melanosis corneae is derived from the stroma pigment, which is morphologically, and chemically different from and is formed much later than the ectodermal iris pigment. The gray and bluish eyes should then not be included in the eyes with melanosis. All data point in that direction. According to this conception the tissue elements, which remain in contact with the cornea, have genetically the same value as the iris cells and would have the same power of becoming pigmented about or after birth.

It seems that we have not to deal with true melanosis; viz. a hyperpigmentation exceeding the normal, but rather with a displacement of pigment. It seems to have only slight influence on the vision. The heredity could not be investigated. Slow and insufficient absorption of the *membrana pupillaris* seems hereditary. (This paper appeared as separate article in Tydschr. v. Gen. November 30, 1918).

Waardenburg refers to 3 cases of *melanosis iridis*. This condition appears mostly one sided, characterized by a diffuse dark brown to black brown coloring of the iris, with a change in the relief. Instead of a trabecular design one sees small warts intersprinkled with some larger papilloma-like enlargements. A reproduction of such a case shows, R. of a 15 years old girl with typical melanosis. The eye with the melanotic iris has some brown violet spots in the sclera, and a metal glossy fundus without visible intervascular spaces, on account of a dark tapetum.

The second case is that of a 13 years old girl with brown eyes, L. being temporally melanotic, with 7 large verrucae and nasally a jet black spot in the minor circle, while the nasal part is dark brown with green, not entirely melanotic—a case of partial melanosis in one eye with exceptionally black coloring of a part. This eye shows a slight corectopia and a white spot on the anterior lens capsule a remnant of pupillary membrane.

The third case is a 15 years old girl with marked corectopia R. up and L. down, luxation of lens in opposite direction, a diffusely colored iris without verrucae and without trabecular pattern. These eyes show pigmented spots at the posterior lens capsule where strings adhere, which connect the lenses with the ciliary region and seem to be stretched fibers of the zonule of Zinn. The last 2 cases do not show melanosis of sclera and fundus.

This condition of melanosis, which is an excess of pigmentation of one or more parts of the eye, and goes over in a fifth of the cases into melanosarcoma, must be sharply separated from heterochromia.

Waardenburg shows 3 typical cases of *Heterochromia*. Here the light eye is the sick one contrary to the melanosis. The prognosis of this light, sick, eye is favorable in so far that the secondary cataract can be extracted well and the cyclitis and vitreous opacities seem not to have a disturbing influence. A section of an excised piece of the iris shows as only sign of chronic inflammation, a large number of mononuclear cells with eosinophil granules in the iris stroma. Waardenburg did not observe Descemet spots in his 16 cases. He found now and then vitreous opacities. He found in 6 cases cataract, 4 cases were a true lusus naturae without any complication, one in a woman-sufferer of tabes and anisocoria, one with persistent hyaloid artery, one with sympathetic paralysis and 3 with congenital coloboma of iris, one of which showed marked remnants of pupillary membrane and anterior capsular cataract with coloboma of the choroid.

These last cases may not be classed with the typical heterochromia (Fuchs). On the contrary these eyes with congenital defects, showing the greatest deviations and the strongest pigmentation, without speaking of melanosis, must point to another explanation. In any case they cannot favor Fuchs' opinion, that the heterochromia is the result of pigment hypoplasia. Waardenburg wishes to consider it in connection with normal pigment disposition; his investigation of iris bicolor made it clear to him that here not a complicated hereditary process can be alone considered.

Discussion.— Faber saw years ago, in a 78 years old man with very brown irides and one sided cataract, brown excresences at the pupil margin, reminding one of ectropium uveae of horses. During the operation much pigment came free. He asks if this has been melanosis. He also saw once in a dog after a serious corneal inflammation much pigment appear in the cornea and conjunctiva.

Van der Hoeve had observed a number of cases of heterochromia with cataract but hardly ever missed symptoms of cyclitis with the corneal microscope; heterochromia with sympathetic paralysis is seen in young people, not in those where it originates in old age. The distinction between melanosis and heterochromia seems a little arbitrary. In a patient with original one sided melanosis, the other eye developed later vitreous opacities and cataract, pointing in the direction of heterochromia, so that here probably both conditions were present at the same time.

Waardenburg stated that cataract formation in the strongest melanotic eye seems to be rare. He insists upon the distinction of melanosis and heterochromia. It is however necessary to know the normal degrees of iris pigmentation.

Instrument for Examination of Hemianopic Pupillary Reaction, to be Attached to a Corneal Microscope.

H. Weve has deviated from Hess' principle by having the light sources form their foci rather far out in the pupillomotoric zone. This made it unnecessary to verify for R. and L. separately. Weve has been able to verify his findings in a case of hemianopsia through hypophysis tumor with positive, and case of cerebral cortex affection (thrombosis) with negative hemikinetic reaction.

Senile Macular Changes and Senile Lens Opacities.

Van der Hoeve found during 1914 to 1918 in the Groningen Policlinic among 14,042 patients, of whom 1,336 are above the age of 60, in 329 eyes of 173 patients senile macular changes; increasing with age:

from 61-70 years in 6.125 per cent;
from 70-80 years in 23.04 per cent,
above the 80 years in 30 per cent.

The vision suffers very much. It is remarkable that senile lens changes were found so seldom and in so slight degree. If the macular change was very pronounced lens opacity was absent or very little. Is the lens opacity pronounced, then usually the macula deviation is absent. It follows that both changes cannot be due alone to old age.

Van der Hoeve admits an influence of light rich in *ultraviolet rays* on the appearance of senile lens opacities. He accepts as cause an affection of the ciliary body, which becomes affected thru diffuse dispersion in the lens, which he has demonstrated in 1911. The diffuse dispersion in the lens makes that a part of the incident light, and especially the ultraviolet rays deviate in all directions. The ciliary body becomes affected in its least resistant part—the secreting epithelium. This changes in the course of years the secretion of the nourishing fluids for the lens so that the lens begins to become opaque.

This diffuse dispersion protects the retina against a too large quantity of ultraviolet rays, and the speaker thinks that the senile macular changes may be explained thru excess of ultraviolet rays. As a preventive against these senile changes the modern yellow-green lenses are recommended.

Discussion—Blok asked if many macular changes have been found in aphakics.

Snellen was sceptical as regards the ultraviolet light; the glassblower, who stands with his back to the fire, which even then contains less violet rays than the daylight, while a helper gives him the fluid glass mass from the fire, cannot get his cataract from the ultraviolet rays, rather heat must be influential. The quicker ripening of the cataracts in India and the prevalence among farmers could be accounted for by the heat. Possibly the influence of heat on the body has greater significance than on the eye itself. It would be interesting to compare florists and movers, both equally exposed to light, the first doing light, the last heavy body-work.

Mulock Houwer thought that from the anatomic standpoint objections could be raised; as the degeneration does not remain limited to the center of the retina, but often extends widely. At the center the retina thru its thickness would have a protecting influence.

Rochat referred to the observation of Lindberg, who often saw the cataract preceded by a disappearance of the pigment of the posterior surface of the iris in the lower nasal quadrant, which was ascribed to the same rays.

Platenga observed an earlier presbyopia in the inhabitants of the tropics. He asked the speaker's opinion, if this also depends on the same influences.

Weve thought that euphos glass would be necessary, as common glass has the same protective influence. The question rises if cataract happens more rarely in myopes, who have worn their correction from youth on.

Nicolai asked the explanation of the fact, that some old people do not have any macular or lens changes, and how to explain the distinct tendency to familial affection sometimes found.

Van der Hoeve in his reply mentioned that naturally numerous influences exist, which can produce cataract, that his theory will not embrace all cases. He is willing to accept the possibility that families exist, where the dispersion in the lens is rather stronger, with a greater consequent production of cataract. He saw some macular changes in aphakic eyes, but one should not forget that probably more ten-year periods are necessary before the changes become manifest and that the aphakic eyes are protected by strong lenses. He agrees with Weve that common glass protects the eye, altho not absolutely. He called attention to Elliot's observation of retinal changes with cataracta nigra (that is with transparent lens), and that chorioiditis should so often be found in Eskimos. He does not blame the ultraviolet rays for the glassblowers' cataract, he rather suspects the ultrared rays, with Crookes and Vogt: This cataract begins in the pupillary space, and must therefore be of entirely different character. As to the ophthalmoscopic picture—the functional disturbance is more limited to the fovea, so that perhaps the more peripheric fundus changes are situated in the more internal retinal layers and then could be attributed to the stronger absorption in the thicker part.

Visual Acuity as Measure of Function of the Retina.

H. Snellen mentioned that the visual angle under which objects can still be recognized, is dependent on the clearness of the retinal images, the size of these images and the function of the retina. The last factor can only be determined by exclusion of all the other influences.

We have no trustworthy means to find out with opacities of the refracting media how much the acuity is diminished thru these, and how much thru a possible simultaneous retinal affection.

But even with exclusion of all other factors and acuity of 6/6, it is dubious if the retinal function is entirely normal. When the function of the retina has not fallen beneath a certain value the acuity is determined exclusively by the anatomic relations of the retina, namely the size and situation of the cones and rods.

Snellen wishes to explain in this way the asthenopia from anemia. As a rule they have a normal visual angle and a large accomodative power. Still they cannot read or work at a short distance, or cannot continue it. If they receive a slight help (a lens of + 0.5 D. is often sufficient) they are able to do so. One might think of a suggestive influence. Snellen thinks that another explanation should be given, namely; a slight neuroretinitis or insufficient nutrition of optic nerve and retina, which has diminished the function even if the visual angle is normal. The stimulus becomes weakened, is perhaps too weakly propagated for automatic reflex production of the necessary accommodation. If the patient is helped with a weak positive lens the stimulus becomes enforced and the right amount of accommodation is produced, which otherwise can be gotten only with the most intense exertion.

An accidental observation confirmed that the retinal function even with full visual angle can be inferior to the normal. A patient cured of strabismus after tenotomy, examined for binocular vision by the Snellen Sr. method of the colored letters, while he had normal V. with both eyes, and with each eye separately could read the red or green letters, while using both eyes together, read with one eye all corresponding colored letters, and with the other only the largest. One might think that the patient on account of his strabismus suppressed the image of one eye. But Snellen found this also in patients who had never squinted. On the contrary he does not believe that the poorer function of the retina is caused by the squint, but that the formation of squint is favored thru the absence of a strong stimulus for fusion. Snellen also explains the fact, also mentioned by Straub, that with hyperopes, especially anisometropic hyperopes, in the weaker eye the hyperopia largely is manifest, in the other largely latent. The stimulus for the last eye is then strong enough to provoke immediately the right accommodation in the first eye, which lags thru insufficiency of the stimulus.

Discussion—Nicolai does not agree that the accommodation in the one eye may be provoked differently from the other.

Snellen not seldom found a quick reflex action from the good eye, and from the poor eye not such a quick response, and supposed that weakness of the retinal stimulus caused this. So a retinal disturbance can be supposed in anemic asthenopia, that the stimulus for reflex focussing is insufficiently strong, and only is reached after full attention; weak glasses may be sufficient to make the image so much stronger, that it produces a sufficient stimulus.

Roelofs mentioned the importance of distinguishing the observation-circle and the space sense and the significance of contrast. His visual acuity is 2 in clear weather, but distinctly less on dark days. The true light sense must be separated from adaptation; the first depends in high degree on contrast, the last one surely not.

Visser said that the difference in visual acuity between the two eyes becomes greater with the red green letters than with simple determination of vision. The function seems to increase during exclusion of the other eye.

Van Moll had, after extraction of the lens, important disturbance of his adaptation.

De Kleijn thought that a lower tone of the ciliary muscle could explain the less powerful action of the stimulus.

Snellen said that this might be possible, but that then the cause of the weak tone must be explained. It is probable that the tone does not develop on account of the two weak stimulus. Adaptative disturbance in aphakics was not rare formerly, caused, perhaps, by the too large iridectomy. A psychical exclusion, as Visser supposed, he did not think probable, as during reading each eye separately had the full attention.

H. Weve reported a case of Tertiary Lues of the Antrum of Highmore and the Orbit.

(Already published)

Discussion — Rochat demonstrated some slides of orbital gumma. He had received for examination the entire contents of the orbit of a man of some 40 years, where evisceration was done for tumor, with blindness and pain of the prolapsed eye. Lues was not suspected. A gummatous mass with caseation and endarteritis obliterans was found within the muscular funnel, which had partly grown around, partly infiltrated the nerves and bloodvessels. The recti muscles appeared much infiltrated, and caseous gummata were found in them. The paralyses were caused as well by diseased muscles as by destroyed nerves. After this diagnosis a Wassermann was made and found positive.

Wibaut asks if sporotrichosis should not be considered.

De Kleijn considers the X-ray plate not typical for tumor, rather is against it, as the bony walls are not affected and the ethmoid could be involved. He is interested in the age of the patient as this condition seems mostly to affect old people. He observed it in a man of 48 years old, with symptoms of hereditary lues.

Weve states that in the literature no cases are reported of sporotrichosis with this picture. It could not be found in the specimen; also a secondary infection would not have remained absent. He remains of the opinion that a tumor gives a stronger shadow than an empyema. The affection seems to appear at all ages, sometimes with acquired lues 22 years after infection, sometimes in sufferers of hereditary lues at an age of 50-60 years.

Struggle of the Visual Fields (With Demonstration).

Prof. Dr. W. P. C. Zeeman reported for himself and Dr. O. Roelofs, extending their former investigations, which showed that if different shades of gray are offered to each eye, one receives an impression between these monocular impressions. But if the difference is very great such a combination is not always possible, and it can come to suppression of one image or to alternating suppression, to struggle. The course of these oscillations was registered with the kymographion, which showed that the share of each eye was about alike, when the eyes were equal; that thru one sided diminution of contrast the share of one eye could be diminished. This was also studied in the periphery of the visual field. The presence of contours on one side did not exercise a demonstrable influence on the course of the struggle, even if these contours were in the same direction with the lines of the experimental object.

The influence of the ocular movements was more striking, and could mostly be explained by changes in distinctness of images and contrast, caused by these motions. The lines which are followed by the fovea, win over the lines on the other side, which are received on more peripheral parts of the retina.

These investigations also produced important data regarding the attention. This struggle registration in anisometropes demonstrates the different parts of either eye in observation, and the influence of the correction. It makes more understandable, why a one sided amblyopia is often found with hyperopia and very rare with myopia. Here both eyes are always directed at one point in the real world, and they can force their images with equal potency. In hyperopia on the contrary one eye is always adapted for a virtual far point, and the constantly blurred impression of this eye will remain inferior in the struggle. A more detailed account of these investigations will be published in the Archives Neerl. de Physiologie.

AMERICAN OPHTHALMOLOGICAL SOCIETY

FIFTY-FIFTH ANNUAL MEETING

Atlantic City, June 14-17, 1919

President, DR. LUCIEN HOWE, of Buffalo

(Continued from Page 691.)

Ocular Complications of Typhoid Inoculations.

Dr. F. Phinizy Calhoun, Atlanta, Ga., called attention to the fact that our French confreres in ophthalmology have recorded such complications, notably herpes corneae with ulceration, retinal exudates, and hemorrhages following renal complications. The author reports five cases of uveal inflammations which immediately followed the first or second inoculation against typhoid fever. All had iritis. One had suffered from a previous gonococcus infection, and one gave a plus Wassermann; but the other three gave negative Wassermanns. All the cases recovered.

It has been suggested that eyes which had old lesions, such as corneal scars or iritis or choroiditis, are rendered more susceptible to the toxic actions of a foreign protein.

Discussion: Dr. George H. Bell, New York, thought the cases very rare. He had seen only one, which he showed at the New York Ophthalmological Society, and also at the Academy of Medicine in New York. His patient, before he entered the Army, had a vision of 20/20 in each eye. He was inoculated with antityphoid vaccine twice. The first injection was followed by no complications. The second injection, which was given one week later, was followed by a chill, headache, malaise and rise of temperature. His eyes became inflamed. He could not keep his eyes open, and suffered greatly from the light. Both eyes became inflamed at the same time. He was treated in the Army Hospital for ten months. His vision when I first saw him was 5/200. He had a deep keratitis. The pupils reacted to light and the eyes were quiet. There were some gray opacities in the deep layers of the cornea. Seen with the naked eye, the opacities seemed uniformly gray; while with the magnifying glass, these opacities might be resolved into dots.

This patient has now been discharged from the army, and receives a pension from the Government. I have had him under observation since September 19, 1918; and there has been no improvement in his vision. I would also state that he has had two Wassermanns and a spinal puncture, all of which were negative. He has also had three injections of the old tuberculin, which were given in increasing doses without any reaction.

I think that all lesions that may occur after antityphoid inoculation and can be regarded as due to it, should be so regarded. No lesion should be ascribed to the inoculation that does not arise during or very shortly after the series of injections, until after a thoro investigation.

Dr. Walter B. Lancaster, Boston: I have seen no case of uveal inflammation that I recognized, but I have recognized a considerable number of cases of neuropathic keratitis. The first was so characteristic that it could not be easily overlooked. The patient was the commanding general of our camp. He had had the typhoid inoculation, which had made him rather sick. When I first saw him, he had herpes, cold sores on his face. Lesions on the cornea were, therefore, easily recognized. That was early in the establishment of the camp, so we had occasion to watch for these cases as the recruits came in and received inoculations. We saw, certainly, over a thousand; and probably over twenty cases my assistant made record of, and will perhaps make a report on this condition. The condition was not strictly ophthalmic, but neuropathic, and probably in the ganglia.

Vision of Aviators.

Dr. W. H. Wilmer, Washington, D.C., reported his further experience regarding the ocular function of aviators.

In selecting fliers, it is absolutely necessary to see that the eyes are entirely normal, for affections that are merely inconvenient on the ground, may be serious in the air. There are different types of fliers, and normality is more important in some of these than it is in others. When, in the course of training, errors of refraction become manifest, these should be corrected by means of appropriate lenses. There is a close correlation between successful flying and good stereoscopic vision. In case of weakness of the eye muscles, general rest and ocular exercises should be prescribed. A successful combat pilot, with trained air vision, who loses an eye may, in the exigencies of war, be seriously considered for return, under certain conditions, to a flying status.

In the classification of aviators, a cycloplegic should be used, and the fields for color and form should be recorded. Frequent reexaminations of flying officers are necessary. A short simple reaction time is of great value to the combat pilot, but only if associated with calm determination and well coördinated muscular action. No quick, accurate method of testing ability for night flying has been discovered; and there are still many problems concerning the eyes in aviation remaining to be solved.

DISCUSSION. Dr. Alexander Duane, New York: Dr. Wilmer's paper brings to my mind one point that I tried to emphasize this morning; and that is, that we must always consider whether the tests that we make actually show what we wish to determine, i. e., a man's real availability for the work that he has to perform. In other words, are the man's eyes, when tested, functionating under the same conditions as they do in actual practice? If they are not, then our tests, unless we make allowance for their fallibility, give us false ideas. To particularize,—Our ordinary visual test is one of sharp contrasts, i.e., of black letters on a well illuminated white ground, or *vice versa*. Never, in actual practice, has an aviator to deal with contrasts of this sort. On the contrary, he is all the time concerned either with objects (flags, semaphore signals, ordinary lights, moving bodies of men, roads, etc.) whose contrast with their surroundings is extremely slight, or else with those (e. g., search-light signals) in which the contrast is extremely vivid. Our laboratory tests should be used only as a preliminary examination, to eliminate the obviously unfit; the ultimate decision as to fitness resting upon examinations made under service conditions, and with objects in their service relations.

Capt. Harvey J. Howard, M. C., Mineola, L. I.: I have been working on recommendations of tests to be applied to aviators. We have recommended very strongly the use of a cycloplegic and the taking of the color fields, especially the peripheral color vision.

Dr. T. Passmore Berens, New York: In the American Expeditionary Forces, nothing had been prepared for research work, and it was so cold that it was actually impossible for us to handle the instruments.

About the time the Armistice was signed, we got into our regular place and had a well equipped room for the laboratory. It is to be hoped that the Mineola research place will be continued, so that it will not again be necessary to try to do such work under war conditions.

Dr. Allen Greenwood, Boston: I cannot let this occasion go by without calling attention to the wonderful work that Colonel Wilmer has performed for American aviation.

Dr. Nelson M. Black, Milwaukee: Office tests are not comparable to field tests. The objection to field tests has been that they consume too much time; and weather conditions are a factor in determining when and how they shall be made. But in every instance, the fact that office tests do not bring out the visual acuity of the men, especially for railway service, has been forcibly brought to our notice. The necessity arises for uniform methods of testing vision in these various conditions, so that the test shall be in conformity with the conditions under which the men will have to use their vision. Tests in accordance with the conditions under which the men fly are necessary in aviation examinations. They are also necessary for naval signalling, as well as distinguishing railway signals.

Dr. Lucien Howe, Buffalo: For the casual visitor to the laboratory at Mineola, it was interesting in the extreme to see the methods and their scientific accuracy. It was my privilege to go there frequently. At first, I went merely from curiosity; but I went afterwards as a student. I want to pay my tribute, also to the very great talent of those doing the work, and the high value of the work being done.

Dr. W. H. Wilmer, Washington: With regard to what Dr. Duane has said, I must acknowledge that he is always practical, as well as scientific. The very fact he brought out, that the laboratory or office test does not give a true estimate of visual acuity, we realized more and more. We did use Snellen's type, but we also employed Ives' test, in which wires are put apart, and then together more and more, until they make an acute angle, and then an angle no longer recognized by the retina. That is a very good clinical test. I know that in the Ophthalmological Department they often took a man and made him stereoscope objects, just as he would have to do on landing with the wires, buildings, and trees. Just the things that they had to avoid. We tried to make the examination practical. We realized that a man might be physically perfect and perfect in pathologic reaction, and yet not be a good fighter or flyer; and, the reverse of this, we recognized that a man might not be in the best physical condition, but possess an aggressive spirit, a spirit of service, which would make him excel a man far superior to himself in these other respects. In this connection, I cannot refrain from mentioning G—, who had never been able to go a consecutive year to school. He was told then that he was, as some would say, nervously unstable. He was a good shot, but physically weak. When he became an aviator, he was shot down eight times and had innumerable accidents; but that wonderful spirit of his conquered all obstacles, and he was soon up and back again. On one occasion, he had just been shot down, and was supposed to be at home recuperating; but he slipped away to a neighboring airdrome, and went up without a machine gun and exposed himself to a German fighter until the latter had fired five rounds at him. Then he came back. When rebuked for his foolishness, he said: "It was not so foolish as you think. I have been told that a man who is shot down loses his nerve; and I wanted to see whether I had lost mine. I have not." The physical test is important, and the reaction time is; but if, on living with a man, you find that aggressive spirit, you have a man who is fit to fly.

Research Work of the Air Service.

Dr. Walter B. Lancaster read a paper on Research Work in Ophthalmology at the Medical Research Laboratory of the Air Service Division of the Surgeon General's Office, and its Bearing on the Teaching of Ophthalmology in America. He gave reasons for selection of the subjects chosen for investigation, and spoke of the work previously done at the laboratory. There was difficulty in getting research workers in ophthalmology. Most of the work on physiology of vision in recent years has been done by psychologists and physicists. Very little research on the physiology of vision is being done by ophthalmologists in medical laboratories, and some of that not very creditable, because of lack of training. On the other hand, the teaching of ophthalmology is inadequate because it lacks the stimulating influence of research.

A Test for the Judgment of Distance.

Captain Harvey J. Howard, whose paper was published in full in this Journal, p. 656, expressed regret that his attention had not, until today, been called to the valuable paper of Dr. Blaauw upon this subject.

Discussion—Dr. Alexander Duane, New York: I had the opportunity of visiting the laboratory and inspecting the apparatus that Captain Howard has described, and I derived three impressions from it: The first was the extreme precision of the test. In fact, as Captain Howard says, a very slight variation in the distance between two objects seen at a distance of six meters is instantly perceptible to the observer. The apparatus seemed very simple; and the test very satisfactory, accurate and precise.

The second impression that I gathered was the convincing evidence it gave that monocular vision gives us no perception of depth, in the proper sense of the word. That is supposed to be a truism, yet it has been denied recently, and it is satisfactory to see the convincing proof that we get. On closing one eye, that delicate perception of depth that we had before immediately vanished; and we could not tell where the rods were.

The third impression that I obtained was the most satisfactory of all. It was the impression of stimulation and inspiration to be derived from visiting an institution of that kind, and seeing what the men were doing there, the spirit in which the investigation was conducted by all the men, the wholeheartedness and unselfishness with which they went into it, and the stimulation that came to the onlookers to go and do likewise. I wish that more had seen it. If they had, they would join in the wish that this work might be continued.

Dr. E. E. Blaauw, Buffalo: I wish to give expression to my great satisfaction with regard to this work. I should like to suggest that the instrument should be entirely black, without this shading, so that you do not get any reflection. In the third, I think that the two images used should not be those which give at six meters an impression of solidity. At the New York meeting of the A. M. A. there was expressed the opinion that binocular vision is of very little value. If the war has done nothing else, it has stimulated the belief that physiology is of great importance. I am grateful for this proof of it. This little instrument of Brooksbank James is not only of value in aviation, but also in determining the loss of the power of binocular function in accidents.

Dr. Allen Greenwood, Boston: I just want to call Dr. Howard's attention to a little instrument devised by Dr. Spearman of London. Instead of two posts, there are three. The third is on a movable carrier that you can set from beside the man you are examining. You cannot tell with one eye whether this middle post is between the others or not; but with two eyes, you can. If you have something that the patient can turn, the man who is being examined can make it possible for you to measure his binocular fixation and judgment of distance very well.

Dr. W. H. Wilmer, Washington: The description of Spearman's apparatus was in the part of the paper that I did not read. That is, I described Spearman's original apparatus, which is better than his last. The last has a milk-glass slide; but the light is of variable intensity at the back. Professor Spearman finds that his good fliers practically all qualify well, and that those who fly badly nearly all fail to judge well by this test. Its practical use has been of great value.

Dr. C. F. Clark, Columbus, O.: I was greatly impressed with the suggestion that there may be a permanent school for the study of these subjects. It occurs to me that as this is a thing largely a matter of measurements and standardization, we might appeal to the Bureau of Standards, who might be induced to take it up.

Dr. T. Passmore Berens, New York: When I first started to work at Mineola, we were all, of course, terribly interested in getting distances. Finally, we thought that there might be something in how quickly the man could react. We found that some men who had lost one eye could still make judgment of distance accurately and quickly; and that something that would record reaction time would be valuable. We also thought that it would be well to change the lighting. It is, of course, more difficult to fly at night than in the daytime. It is a question of putting the thing down to the conditions that the man would meet.

Another question was getting motion in the test. In an airplane a man has to make judgments of distance from his moving airplane.

Professor Spearman also thought that it would be fine to put motion into his own test. He had three bars, all movable; and all would be recorded on the chart at once; so that all during the test, while the man was trying to keep this bar in accord with the other to be recorded on the drum, you could see his judgment and fatigue all during the examination.

Dr. F. H. Verhoeff, Boston: It is doubtful whether Dr. Howard has determined really the minimal binocular parallax. It seems to me that it is questionable whether this test will decide the ability of the man to judge of distance. We want to know with what accuracy he judges distance, and not the slightest distance that he can judge, which is what this test shows. It is the same objection that Dr. Lancaster has pointed out, and other people. Whether these scientific tests are going to be the final standard, is a question; because what you really want to know is whether a man can make a proper estimate of the distance between two objects. No one, so far as I know, has ever attacked that problem from the standpoint of binocular vision. Years ago, I thought of it, but was unable to devise an accurate method of making the test. There are really some objections to this method of testing the minimal binocular parallax.

Dr. David W. Wells, Boston: Is it possible that this smaller angle of stereoscopic acuity may be due to some monocular estimation of depth, from some shadow which might be inherent in the black rod on the white ground? It seems to me that Dr. Clark's instrument, which does away with the rod altogether, and substitutes this simple light, which is movable in the anteroposterior direction, theoretically is a more exact piece of apparatus.

Capt. Howard: In regard to what Dr. Blaauw mentioned, I would state that I did use dead black on the apparatus, and painted the rods black so that the only white surface seen was the background, on which the light fell and came on the rods from behind.

As for the apparatus of Dr. Spearman, I have not had an opportunity to see a description of it. Three posts are mentioned, two side ones and another middle one. I wish I had time to show the advantage of two posts over three. It was posible to show that the man would project one rod nearer than the other, while the other was really the nearer. There were twenty-three who did it. If we had used three rods, that would have been impossible. There is no reason for one man's projecting one rod nearer than the other, while another does not. It is largely due to a difference in visual acuity. I found that there was a difference in this respect between the two eyes. In my opinion, it would be better to have 20/20 vision in each eye than 20/20 in one and 20/10 in the other; because I found that a man with a difference in acuity between the two eyes is a poor judge of distance in using the binocular parallax test. Of course, when it comes to the motion parallax, as Dr. Blaauw mentioned, that is a thing that is extraneous to the individual. The motion parallax helps us all alike on the outside.

As to taking time exposures or methods of recording time, to see how quickly they could do it, I would say that in a new apparatus that I tried to design, and which Bausch and Lomb are making, I have included a shutter for the purpose of recording the time. I might mention that the value of the shutter in the simple apparatus, I found, was so great that I decided that the reaction time ought to be gone into and some results obtained on that. In regard to what Dr. Verhoeff has said about the visual angle and judgment of distance: I tried ten men in two different ways with both eyes open, and with only one open; and I found that the difference between the two rods varied from thirteen millimeters when both eyes were open to over two hundred millimeters when only one eye was open.

Regarding Dr. Clark's apparatus, I would say that it has been impossible for me, in this paper, to go into the bibliography and discuss what I had read. My paper would have been too long. I hope at some time in the future to take up that side. I was interested in seeing Dr. Clark's apparatus, a few months ago. My principal criticisms, which I told him at the time, were that the test objects were superimposed. I proved that you cannot determine the difference of superimposed objects, unless you get into the realms of the visual angle.

The Maddox Rod Screen Test.

Captain Percival Dolman read a paper on the Maddox Rod Screen Test. This investigation of the Maddox rod test was undertaken at the Medical Research Laboratory because of the variable and inaccurate results obtained with it, in examining the eyes of aviators.

A review of the literature reveals many criticisms of the test which support the conclusions of the laboratory. These criticisms are based on (1) The inability of some patients to see the line of light; (2) the tendency of the line and the light to fuse; (3) the instability of the lateral distance between the line and the light; and (4) the tendency of the test to show excessive esophoria.

These phenomena were analyzed and their influence on the accuracy of the test explained. The Maddox rod combined with the screen test, the rapid covering and exposing of the eye while using the Maddox rod, overcome these imperfections. It is, in addition, a simple test of great delicacy and accuracy.

Discussion: Dr. Alexander Duane, New York: I have found the cover test useful in this way, combined with the Maddox Rod test, and put the red glass in front of the eye before the prism is put on, and then suddenly take it off, and see whether the images coincide; and if not, repeat this test with another prism behind the screen, until they do.

Dr. John E. Weeks, New York: In regard to the eye before which the Maddox rod should be placed, we are dealing in special practice with eyes that are defective in vision. Frequently one sees less distinctly with one eye than with the other, and it has been my practice to use the Maddox rod over the eye with the more distinct vision; obtaining in that way the results in the quickest possible time.

Capt. Percival Dolman: There is no objection that I can see to coloring the light (that is, to placing the red glass) before the eye that sees the light. Dr. Maddox himself has advocated that procedure in making the test—that the glass be placed over one eye, and the intensity of the light modified in this way. It seems that in the experiments that I have made with the screen over the patient's eye, the color of the light has lost its importance; the only thing necessary being to have it of such intensity that it will not irritate the eye.

As to the choice of the eye before which the rod is placed, I am not prepared to go into that; but I might say that invariably the eye that has the better vision, if there is a wide difference between the visual acuity of the two eyes, would better be covered by the Maddox rod.

The Study of Dark-Adaptation.

Captain Percy W. Cobb, M. C., Mineola, L. I., N. Y., read by invitation a paper on this subject. Tests of retinal sensitivity made under daylight conditions would appear to be of little value to the aviator who is to undertake night flying. The increase in light sensitivity that takes place in the dark has been the subject of numerous studies in the past, while the rate of recovery after exposure to light has had less particular consideration.

It is found that individuals vary widely as to their ultimate sensitivity, and also with respect to the rate at which they recover. These two factors are not, however, interrelated. The individual whose ultimate sensitivity is high is as often of as slow recovery as the night blind, and vice versa. The rate being as three to one in the two cases, where the exposures were respectively fifteen seconds' and five minutes' duration. Some improve rapidly for a time, then stop and afterward go on again.

Second Day

To secure a room suitable for the exhibition of lantern slides a session of the Society was held on Sunday afternoon.

Migration of Eye in Flounders.

Dr. Lucien Howe, Buffalo, N.Y., exhibited specimens of the young flounder and diagrams showing how, soon after its hatching, it swims like other fishes, and has one eye on each side of the head. As it develops, one eye moves around to the other side of the head, or in some species seems to pass directly thru. This brings both eyes on the upper side when the fish comes to swim with one side up and the other directed down.

Aviation.

Dr. W. H. Wilmer, Washington, D. C., demonstrated a series of the U. S. Army air medical films, showing the training of aviators, the conditions of flight and movements required for attack and escape, together with the appearance of objects seen from the airplane in different positions.

War Injuries of Lids and Plastic Operations.

CAPT. JOHN M. WHEELER, M. C., Ft. McHenry, Md., demonstrated certain types of these injuries and the procedures required for their repair, including notching of the lid associated with laceration thru the tarsus, which should generally be prevented by careful apposition of the parts immediately after injury. Laceration of the lower lid from the inner canthus downward and outward requires thoro removal of the scar, advancement sutures, anchorage of angle of flap in slight overcorrection, drainage, and thoro relaxation of the connecting parts. Laceration of the lower lid near the inner canthus requires the use of minute flaps carefully adjusted and anchored in the connection. The bevel notch reducing overlapping of the flaps is of especial value for coloboma at the outer canthus. Subcutaneous grafts are used with anchorage of the conjunctiva and skin at the outer canthus for loss of upper lid. He showed outlines of operations of reconstruction of the lid and lid margin, dermic grafts were used for cicatricial ectropion. The danger of pedicle grafts is that they are liable to contract, causing increase of the deformity.

Multiple Vaccination of Eyelids.

DR. ARTHUR J. BEDELL, Albany, N. Y., read a paper to be published in full in this Journal.

DISCUSSION. Dr. Lewis S. Taylor, Wilkes-Barre: When we consider the lack of care given by many people to the vaccinated arm, and the liability of children to scratch the sore and then rub their eyes with the unwashed hands, it is surprising that more cases of vaccination in the eyes have not occurred.

In a somewhat large experience, extending over many years, I have seen but one case of this trouble. A number of years ago, I was called in consultation to see a child of about five years of age, with what we believed to be a genuine case of revaccination. He had a very much swollen and irritated lower lid, with some discharge; and inflammation involving the lower part of the cornea was present. He was sleeping in the same bed with his sister, and both children had been vaccinated, some time before. The boy, either from his own sore or from that of his sister, had been vaccinated on the eyelid; and there appeared this typical sore on the lower lid; the general condition being the same as Dr. Bedell has described. The case ran a typical course, and the child recovered without any ill effects.

If this condition had been in an adult, we might have thought at once of an initial lesion; as it resembled a chancre. But, there was the history of vaccination, with the still unrecovered sore; and I think that there was no doubt about the diagnosis.

Keratitis Profunda (Or Disciformis?), With Microscopic Examination.

DR. F. H. VERHOEFF, Boston, presented this as the first case of keratitis profunda reported in which the entire eye has been examined microscopically, and the second case of neuropathic keratitis of any kind, uncomplicated by infection, in which such examination has been made.

He concluded that disciform keratitis may be produced by a variety of causes, and from an etiologic standpoint is therefore not an entity. Certain cases of disciform keratitis are of the same nature as keratitis profunda.

The corneal changes in keratitis profunda are due to the action of diffusible toxic substances arising at or near the anterior surface. The changes consist in alteration of the epithelium, destruction of the corneal corpuscles, and injury to the stroma in the anterior layers of the cornea, and proliferation of the corneal corpuscles behind and around the injured area. In addition, there is injury to, or destruction of, the endothelium, and in severe cases deposition of fibrin and leukocytes on Descemet's membrane behind the affected area. Leukocytic infiltration of the corneal stroma is conspicuously absent.

The microscopic findings in the present case strongly indicated a neuropathic origin for keratitis profunda.

Discussion. Dr. William Zentmayer, Philadelphia: I just want to speak of one point. My recollection is that Dr. Blaauw exhibited a case that had been historically studied, and in which the experimental work had been done by a Dutch clinician. The case was published, about a year ago, in the American Journal of Ophthalmology. (v. 1, p. 267). It was similar to Dr. Verhoeff's in histologic findings on the posterior surface of the cornea. There was secondary infection in the case, and the original eye could not be studied to find the original pathology of disciform keratitis; but the experimental work showed very much the same conditions.

Dr. E. V. L. Brown, Chicago: This may very well be on a neuropathic basis, but the picture here recalls the picture that we have in ring abscess, in which there is an equally characteristic zone of necrosis, which may be produced by the injection of organisms into any part of the anterior chamber. That is on a strictly bacteriologic basis; and altho this may be on a neuropathic basis, I do not see why we should assume it from the findings.

Dr. John E. Weeks: I want to ask Dr. Verhoeff if he would give to all reported cases the same classification? I should also like to ask whether the white dots that we see deep in the cornea in disciform keratitis were present in this case? I have seen many cases of herpes zoster with affections of the cornea, but I have never seen disciform keratitis associated with herpes zoster.

The neuropathic findings in many of these conditions cannot, it seems to me, obtain in those cases in which, by means of aseptic measures, the condition is corrected, or recovery takes place rapidly; as in certain cases, at least, of disciform keratitis. This was brought out in discussion, a year or so ago, when I presented a paper before the Ophthalmic Section of the American Medical Association.

Dr. Ryuzo Nodama, Tokaku, Japan, called attention to a paper he had written on experiments concerning the transmission of iodin into the aqueous chamber following the intravenous injection of potassium iodid, in which similar lesions were presented.

Dr. F. H. Verhoeff, Boston: In regard to Dr. Brown's suggestion as to an analogy between the condition I have described and ring abscess, I would say that there was not any in this case. In ring abscess the trouble is evidently due to toxins coming from behind; and as the term indicates, the condition is an abscess. The ring is due to a dense collection of pus cells, and it is evident that the toxins come from behind; because the injury is from behind, while in this condition the injury is in front. The tissues were destroyed in front. The toxins were not able to kill the cells; but they were working from the anterior layer of the cornea, and not from behind.

In regard to the cases that Dr. Nodama speaks of, I would say that I did not run across that. I should like to have seen it. I am interested to find that such conditions could be produced experimentally.

In connection with what Dr. Weeks said, I would state that in speaking of these different conditions of disciform opacity, I did not mean to imply that all these cases would come under what Fuchs calls disciform keratitis; but simply to indicate that they had the appearance, which makes it likely that the picture that Fuchs described could be subdivided still further.

In regard to herpes zoster, Fuchs noted that it is followed by keratitis profunda and disciformis. I have seen disciform keratitis follow herpes zoster.

Ophthalmic Zoster, Retrobulbar Neuritis, Acute Glaucoma.

Dr. Clarence A. Veasey, Spokane, Wash., reported two cases of herpes zoster ophthalmicus with unusual complications.

Case 1. A woman with right ophthalmic zoster, on the seventh day of the attack lost the vision of her right eye except a small part of the upper field. The blindness had spread from the center of the field, and the next day the whole field was abolished without ophthalmoscopic changes. The cornea was not involved. A month later the peripheral field was restored. V. = fingers at two feet. But the optic nerve was now pale and atrophic, and later all vision was lost.

Case 2. A man, aged 30, came with a history of an herpetic attack on the right forehead two weeks before. V. =R. 1/45, L. 6/5. The cornea was hazy, pupil dilated and immobile. Tension 35 mm. The tension became normal in a few days under pilocarpin, hot compresses and a purge; and the patient disappeared.

Discussion. Dr. Arnold Knapp, New York. The association of glaucoma and herpes is interesting, and leads to speculation as to the possible function of the ciliary ganglia. During the past winter, I observed a case that explained the condition as a variety of cyclitis. A woman of fifty-five years developed high tension after herpes zoster—a tension of between fifty and sixty. Under the use of pilocarpin, this tension was reduced; and the attack passed off. During the next six weeks, the eye was quiet; except that three definite corneal deposits could be discovered. That shows that this increased tension from herpes is merely cyclitis, due probably to the same toxic organism as the herpes. This patient, four to six months later, developed marginal ulcers of the cornea, for which a mydriatic was given. I had feared to do this, but did so without causing a return of the glaucomatous manifestations.

Dr. George E. de Schweinitz, Philadelphia: I have seen several cases of acute rise in intraocular tension associated with herpes zoster. I will refer to two of them, along the line of what Dr. Knapp has just described. In the first case, there was a curiously produced herpes zoster ophthalmicus, unassociated with any corneal lesion, and also a little conjunctivitis. On the third day after pronounced opalescence of the lens, there appeared a very pronounced rise of tension, and a rather deeper anterior chamber than one would have expected. This condition disappeared under the influence of miotics. Following this, there appeared a stage of slight ciliary flush. It was a very important case; and I spent anxious nights because I did not know whether to use a mydriatic or not. But finally, I did so without producing a rise of tension. The ultimate result was good; but, in association with what Dr. Veasey has said, curiously enough, there was a localized patch of atrophy of the optic nerve, with a corresponding defect of vision—altho the central vision is good. I do not know what could have produced it. Perhaps it may have been due to some alteration in the vascular supply, as in many cases of arteriosclerosis.

The second case is one of a more common kind. Following a small herpetic ulcer of the cornea, which yielded to ordinary treatment, the patient recovered entirely, with normal vision, normal fundus, and no ophthalmoscopic changes; but developed, some weeks later, a persistent rise in tension, which always yielded to miotics, but always reproduced itself on the cessation of their use. There never was any fault in the field of vision, and never any reduction of the central visual acuity, as long as the miotics were used; but prompt return of tension on their cessation. Ultimately (the case was one that I saw with a colleague) the patient was cured by iridectomy or some such procedure.

I think that Dr. Knapp has correctly stated the pathology of these cases of rise of tension, in that there may be an iridocyclitis, either with or without corneal complication.

Dr. F. H. Verhoeff, Boston: In connection with the ocular complications of herpes zoster, a patient I had about eight years ago, had a slight iridocyclitis and slight opacities in the vitreous. These cleared up, and I noted that she had a typical unilateral Argyll-Robertson pupil. She had a negative Wassermann reaction, and no signs of tabes or other syphilitic disease. She has remained in perfect health ever since; but the Argyll-Robertson pupil persists unchanged. The pupil on the other side is absolutely normal in its reactions.

This case strongly supports the view that the Argyll-Robertson pupil is due to a lesion of the ciliary ganglion. As it is unilateral, it is almost impossible for it to be due to anything else. In herpes zoster, you sometimes get motor paralysis in other motor nerves; and, as an explanation of the process, it is easy to see how the ciliary ganglion could be attacked. I feel very strongly that the condition of the pupil is due to lesion of the ciliary ganglion.

Dr. Allen Greenwood, Boston: Speaking of glaucoma in herpes zoster ophthalmicus, it has been my custom to carefully try the tension in all these cases, because of past experience. I have had one case of bilateral herpes—the only case that I have seen in which an absolutely positive diagnosis of this condition was made. In that case, there was increased tension, in spite of all treatment; and the eye had to come to enucleation. In the other eye the tension was reduced with miotics. But for several years afterwards, the patient had repeated attacks of herpes of the cornea, with increased tension, relieved by miotics. Finally at eighty years of age, the patient lost the other eye, following an attack of herpes of the cornea that became infected. The eye sloughed and was destroyed.

Dr. C. F. Clark, Columbus; The points that Dr. de Schweinitz brought out are extremely important from the practical point of view. I have now under treatment a man who had a typical case of herpes zoster, in which we found a positive Wassermann. He had been under treatment for weeks and months for glaucoma. The herpes was recognized, and he had increased tension. He was under the active use of eserin by his oculist, and his case was going to the bad. He had iridocyclitis in connection with the glaucoma. I judged it was well to try a mydriatic in place of the miotic. The specific condition underlying it required treatment also. He had relief immediately, when put under full mydriasis, and cycloplegia.

The important question in therapeutics here is, how we shall determine, as quickly as possible, when to discontinue miotics in cases of what you might call symptomatic glaucoma. I am coming to the conclusion that a very large number of cases of increased tension are to be traced to the localized or immediate effect of the difficulties in the filtration angle, but are not at all true glaucoma, which will resent the use of atropin. In other words, I think that when glaucomatous symptoms arise in the course of other diseases of the eye these may be treated immediately with impunity by means of a mydriatic or cycloplegic, if we can assure ourselves that we are not dealing with a true case of idiopathic glaucoma.

Dr. Robert S. Lamb, Washington: I have noted, in connection with increased intraocular tension, not only with herpes, but also with some other conditions of allied character, that there is a suggestion of what I have called a funnel-iris. The appearance of depth in the anterior chamber seems to be associated with a narrowing down; and the iris seems to recede towards the pupillary margin. In these cases, I have found invariably that I can use a mydriatic without damage. I think they are probably due to an iridocyclitis.

Dr. W. R. Parker, Detroit: I wish to place on record glaucoma occurring in a case of herpes of the brow and side of the face, in which there was a decided increase in tension. The tension was not determined by the tonometer, but estimated by the fingers merely; but it must have been about plus two or three. There was no question of the increase in tension, with the other symptoms that go with it. I persisted in the use of eserin, and was not a little worried about the course that the case was taking. It was only after the tension had been reduced, altho not quite to normal, that I ventured to put in atropin. Within a comparatively short time after this had been done, the tension began to return to normal; and it remained normal. There was in this case, also, distinct evidence of low-grade iridocyclitis. The relation of the two, at the time, did not occur to me. I think that it would have been better in this case if the atropin had been used earlier.

Dr. Hiram Woods, Baltimore: In a recent number of the American Journal of Ophthalmology, someone made a distinction between symptomatic hypertension and glaucoma. It seems to be confirmed by the observations that have been made. I want to add one more.

I had a case that bothered the life out of me while it lasted, in a lady with a definite herpes zoster ophthalmicus, who, after a few days, developed pretty typical symptoms of iridocyclitis. The tension was 35 to 38—just enough up to alarm me. As soon as the miotic was used, one-tenth of a grain of eserin and of pilocarpin to the ounce, her pain was increased. I began with a weak solution of homatropin; and under atropin, taking the tension carefully as the stronger mydriatic was used, the tension gradually came down. It was evidently a case of secondary iridocyclitis.

This introduces an important subject, when does atropin do good, in spite of apparent hypertension? There are cases of that kind. This woman, in the course of her eye trouble, developed suddenly a flare up of an old chronic appendix. Dr. Finney was called in and operated. Within four days, her eyes cleared up, and have remained normal ever since.

Dr. John E. Weeks, New York City: Inflammation or irritation of the iris produces a change in the character of the aqueous humor, whether following operation or following disease; and in certain cases this change in the aqueous includes elements that will not pass readily thru Fontana's space. In those cases, we are apt to get the result of tension. We all know, also, that in herpes zoster ophthalmicus, the iris is affected; and in some cases, the ciliary body, whenever the cornea is affected; and it is possible that the iris and the ciliary body may be affected when the cornea is not affected. Consequently, a rise in tension in these cases is easily explained on this hypothesis. The change in the aqueous has been definitely proved.

The use of miotics or of mydriatics in these cases may be resorted to in a tentative way. I have frequently seen that a mydriatic in these cases would produce a more beneficial effect than a miotic; but the reverse is also true. In certain of these cases, the patient must come to operation; because probably, in addition to this interference on the part of the changed aqueous humor, there is a condition that tends to keep up the intraocular tension. There were two cases that came to operation in my service. One case was referred to me by Dr. Cutler, who observed it for some time before asking me to take charge of it. Altho in many cases we may greatly relieve the condition by the use of miotics or mydriatics, in a certain small percentage operation must be undertaken.

Dr. Lee M. Francis, Buffalo: On this question of the use of miotics with cycloplegics in increasing tension, it seems to me that we are forgetting, for the moment, at least, the information that the corneal loupe can give us. If there is a deposit in Descemet's membrane, it seems to me that this instrument will decide whether or not we can use atropin. In the presence of a deposit on this membrane, even tho only one or two spots, the use of a cycloplegic is clearly indicated.

(To be continued.)

ABSTRACTS

René Onfray. Retinitis in Diabetes.
[Ann. d'Ocul., v. 155, p. 533.]

The author discusses this in an article of 37 pages, containing a table epitomizing 24 cases. There are, also, three figures showing graphically (1) the relation between arterial tension and diabetic retinitis, (2) the relation between uremia and diabetic retinitis, and, (3) the relation between the "constant" of urea secretion and diabetic retinitis.

He discusses the subject under three heads. (1). Arterial Tension and Diabetic Retinitis. Hemorrhages are found either as discrete, punctiform lesions or as red areas; or as profuse hemorrhages invading the vitreous and even culminating in glaucoma or detachment of the retina. This symptom would indicate a hypertension. In some patients, appropriate diet reduced the tension, but in others it was only partly reduced, or even increased further.

(2). Renal Function and Diabetic Retinitis. Ten patients had albuminuria, 4 of whom had about 1 gm. to the liter, but the amount varied. There was hyperviscosity in 2 cases, blood in 9 cases, normal in 4, and hypoviscosity in 2 cases. As a rule the hypertension and hyperviscosity were associated. Edema was found in only two cases. Uremia. In 20 cases examined the amount of urea in a liter of blood serum was, 10 cases, less than 0.5 gm.; 4, between 0.5 and 0.7; 3, between 0.7 and 0.9; 3, one gram or over. The initial urea-secretory constant, determined according to Ambard's method, is a fairly good prognostic method, most of the cases with good or medium constant surviving the retinitis for a long time; at least one case lived 7 years after the retinitis appeared.

(3). Clinical Character of Diabetes Complicated by Retinitis. Since diabetes exists often for a long time without being suspected, it is impossible to say at what stage of the disease the retinitis appears. But in 22 cases, the interval between the recognition of the glycosuria and the retinitis varied from 0 to 28 years, the majority being from 3 to 9 years.

No conclusion could be drawn as to the relation of malnutrition and retinitis as most of the author's cases were not accompanied by loss of weight. The presence of the diabetes indicates nothing as to acidosis, since most of the patients lived a long time after the retinitis appeared. Aside from the fairly constant association of diabetes with hypertension and with nephritis, one case developed in a gouty patient and two followed trauma. In regard to the vital prognosis, only 7 cases have been followed since 1911, of whom 3 died in 2 years and 4 still survive.

As to the pathogenic problems of diabetic retinitis, the hemorrhages are due either to the state of the blood vessels, or transient hypertension or condition of the blood. The white areas are objectively of three kinds: (a) preretinal cicatricial bridges, resulting from a cicatricial sclerosis of the peripheral layers of the vitreous, (b) polycyclic plaques, due probably to unabsorbed serous products, altered by toxic changes in the blood, (c) brilliant white spots, either isolated or in plaques, probably due to fatty deposits.

Retinal lesions of diabetics bear upon general therapy thus: (a) For diabetes without hypertension or renal insufficiency, give only as much carbohydrates as the patient can assimilate, considering the amount of nourishment furnished by the proteids and fats. Small amounts of fluids are to be taken at a time. The appearance of retinitis indicates an alimentation reduction cure. (b) For diabetes with hypertension, to the above should be added treatment directed against the hypertension. (c) In diabetes with uremia two contradictory treatments are indicated, a hypernitrogenous for the diabetes, and a hyponitrogenous for the nephritis. The greatest care is necessary in these cases in regulating the diet.

C. L.

American Journal of Ophthalmology

Series 3, Vol. 2, No. 10 October, 1919

PUBLISHED MONTHLY BY THE OPHTHALMIC PUBLISHING COMPANY

EDITORIAL STAFF

ADOLF ALT,
Metropolitan Bldg., St. Louis, Mo.
M. URIBE-TRONCOSO,
143 W. 92nd St., New York City.
MEYER WIENER,
Carleton Bldg., St. Louis, Mo.
CASEY A. WOOD,
7 W. Madison St., Chicago, Ill.
HARRY V. WÜRDEMANN,
Cobb Bldg., Seattle, Washington.
EDWARD JACKSON, *Editor,*
318 Majestic Bldg., Denver, Colo.
CLARENCE LOEB, *Associate Editor,*
25 E. Washington St., Chicago, Ill.

Original papers and books for review may be sent to any member of the editorial staff. Reports of society proceedings, correspondence, and other scientific communications should be addressed to the Editor.

Proof should be corrected and returned within forty-eight hours to the printer. Reprints may be obtained from the printers, Tucker-Kenworthy Co., 501 S. La Salle St., Chicago, Ill., if ordered at the time proofs are returned.

Subscriptions, applications for single copies, communications with reference to advertising or other business, should be addressed to
H. A. FOX, Manager, 7 West Madison St., Chicago, Ill.

THE ARMY OPHTHALMIC SURGEON

This caption is in truth a bit misleading, for tho the commissioned medical officers in charge of, or working in ophthalmology are denominated surgeons, the opportunity for purely surgical work in proportion to the cases encountered has been much more limited than in other branches of surgical practice.

In the beginning his rôle was eminently that of a diagnostician, for the elimination of the unfit from the vast army of four million men. In this capacity his opportunities were indeed great for the examination of many rare chronic diseases and congenital defects. Often these were of such a character, happening, as they did, in the young, active and presumably healthy men, that the subjects themselves were unaware of their defects, and superficial examinations, even such as would be ordinarily conducted by a general physician, would not reveal the disability or disease.

Later, the exigencies of the work to which embryonic soldiers were put brought out symptoms such as weak vision and asthenopia, for which they applied for treatment. Here, too, the army oculist came into a great work as a diagnostician. Here may be especially noted the existence of a comparatively large number of cases of retinitis pigmentosa, of unexpected fundus lesions diagnostic of syphilis and tuberculosis, rare forms and bizarre types of congenital anomalies;—some of them great rarities in private practice.

It is as consultant that the oculist is of prime importance in actual medical work in the army hospital. Certainly, aside from cases directly diagnosed and referred by him in routine work, the diagnosis of syphilis, renal disease, diabetes, the nervous and the so-called rheumatic diseases, and some forms of chronic infections, has proven of great value. To fill such a position as it should be filled necessitates a wide knowledge of general medicine and surgical diseases.

As sanitary inspector and engineer, the ophthalmologist has seen to the lighting, the care of the eyes, and the prophylaxis when called upon to do so.

As statistician he has learned how to keep proper case records and to make succinct reports. In this office the chiefs of the divisional units particularly have become experts with the fountain pen.

As in private practice, a very large portion of the routine work for the ophthalmic staff has been the measurement of refraction and the prescription of glasses;—for soldiers who had never worn glasses developed eye strain by reason of specific work in the army. Then, too, the officers and members of their families have largely taken advantage of the free service and special talent, the latter of which was not obtainable in the Regular Army.

It is as operating surgeon that the army oculist has been put into the background, especially in the cantonments and hospitals of America. For we have had young men as patients, selected after more or less rigid physical examinations, whose surgical eye affections are largely limited to trauma, pterygia, hordeola and occasionally strabismus.

Battle injuries to the eyes have received their first dressings abroad, and in some cases plastic operations have been performed before returning to America. Still at each large hospital and cantonment a certain number of such cases have filtered thru, giving chances for observation and for such work, particularly secondary operations, as after an eyeball has been removed for injury. For instance, we have had six such cases at Camp Lewis, American Lake, Washington—truly a small number and only to be compared with a one-man surgical practice.

As only a moiety of soldier patients are old enough to have developed cataract, glaucoma or other diseases of elderly people, this class of operations has been conspicuous by its absence.

All of this is in contrast to the work of the Ear, Nose and Throat sections, for the diseases incident to these parts of the head are those of young people. Hence the vast number of tonsillectomies, of sinus cases, of deformities of the nasal septum and of mastoid operations that have been seen in this part of our practice.

On the whole, the oculist of the army has been the eyes of the medical service, and this is his chief function. Certainly he has himself greatly benefited by this training, by a widening of his medical views and by his association not only with the medical officers but with those of the line and with the personnel,—all of which will be of great value on his return to civil practice. —H. V. W.

SOME QUESTIONS OF PRIORITY IN THE LITERATURE OF SYMPATHETIC OPHTHALMIA

An interesting misconception as to the date of Mackenzie's most important publication has been handed down from father to son after the familiar manner of bibliographers. The date of Mackenzie's first description of sympathetic ophthalmia, as given by de Wecker in the first edition of Graefe-Saemisch, and by Randolph in Norris' and Oliver's system, is 1844. This, however, is merely the date of the first French translation of the third London edition. Schirmer, in his monograph in the second edition of the Graefe-Saemisch Handbuch, erroneously gives the date of the third edition as 1839; and further errs in stating that the classic description first appeared in the edition of 1835. Even the mighty Hirschberg falls for this tradition, and refers to the date as 1844, "or better, 1835."

The fact is that Mackenzie's first edition of 1830, under the head of "Traumatic Ophthalmiae," p. 30, says: "We sometimes meet with severe sympathetic inflammation in the eye which has not received the injury." This is all in this edition. In the edition of 1835, p. 560, he says: "We sometimes meet with severe sympathetic inflammation in the eye which has not received the injury, especially in subjects of scrofulous constitution. For instance, a patient applied at the Glasgow Eye Infirmary with severe iritis in the right eye, brought on in consequence of an accidental and destructive laceration of the left." This is also under the heading "Traumatic Ophthalmiae," and is all that this edition contains on the subject. In the edition of 1840, for which Mackenzie wrote the preface in October, 1839, there first appears, pp. 523 to 534, the name "Sympathetic Ophthalmia," followed by the classic account of the disease which is so commonly quoted.

The edition of 1854, which I have seen in the American copy only, contains only a few changes, most of them unimportant and some of them for the worse. An example of the last is the change of title from Sympathetic Ophthalmia to "Reflex or Sympathetic Iritis." This is also true of the description of the mode of transmission, which Mackenzie made evidently under the increasing tendency to ascribe phlogogenic powers to reflex nervous impulses. In the 1840 edition he says: "It is extremely probable that the retina of the injured eye is in a state of inflammation, which is propagated along the corresponding optic nerve to the chiasma, and that thence *the inflammatory action* is reflected to the retina of the opposite eye, along its optic nerve. In the 1854 edition, the sentence is the same up to the word "chiasma"; the remainder being, "and that thence *the irritation which gives rise to inflammation* is reflected to the retina of the opposite eye, along its optic nerve." (Italics mine.)

From the standpoint of priority, the description given by Lawrence has not received sufficient attention. In his treatise on Diseases of the Eye, London, 1833, he gives four tolerably typical cases of sympathetic ophthalmia and says (p. 117): "When an eye has been lost by accident, the other often becomes diseased sooner or later, without any imprudence, or any external influence that would be injurious under ordinary circumstances. This kind of occurrence is so common that it is necessary to warn those who have lost an eye of their danger and to point out the necessary precautions for avoiding it. For this affection of the sound eye, if it is not noticed and properly treated in the early stage, often destroys sight. Its most common form is slow inflammation which may effect [*sic*] the iris, the retina or the internal tunics generally." This, with the case reports, is so far ahead of anything that had appeared up to the appearance of Mackenzie's third edition, that Lawrence easily takes second place among the pioneer students of sympathetic ophthalmia.

H. G.

CREDIT WHERE DUE

It should have been mentioned in our July number, in connection with the valuable paper of Lieut.-Col. Derby on the control of trachoma, that the illustrations that added materially to the clearness and interest of the article were based on photographs given to its author by Col. W. T. Lister, ophthalmic consultant of the British Expeditionary Forces. They actually represent British trachoma work in France, a knowledge of which became the basis of the effective work of Col. Derby and his colleagues in connection with the American Expeditionary Forces, when they had to face the same problems.

In this connection we wish to call attention not only to the extremely cordial relations that existed between British and American Ophthalmologists attached to the Expeditionary Forces; but also to the interest in and desire to render every assistance to the American Journal of Ophthalmology by ophthalmologists in every part of the British Empire. We hope that our readers everywhere will recognize the solid practical worth of the original articles appearing in the British Journal of Ophthalmology; and appreciate the splendid fight that is being made to sustain such an ophthalmic journal under the extremely difficult conditions now existing.

THE HIGH COST OF PUBLISHING

We have before alluded to the difficulties that now beset the publication of a high-class scientific journal. Recently one of the foremost American weeklies came out shorn of its advertising pages and much of its usual reading matter—less than one-quarter of its usual size—because of a "dispute between two factions of a labor union in the printing establishment which prints the magazine." Certain prominent publishing houses have proposed the suspension for several months of a large number of publications as the only way to bring about more stable and reasonable conditions.

Our last unpleasant surprise in this direction was an increase of 15 per cent in the cost of printing this journal, estimated on and added to the preceding similar increases, which became effective when notice of it was received last month. We have endeavored not to allow these difficulties to impair the quality or limit the size of this journal. If only the new year will show an increase of 15 per cent in the number of our subscribers, our success in meeting the high cost of publishing is assured.

Such an increase in our subscription list would only represent 10 per cent of the American ophthalmologists who need this journal but do not now subscribe for any journal published with regard to their specialty. It can be easily brought about by active propaganda on the part of our subscribers among acquaintances who do not take an ophthalmic journal. It is a rare opportunity to do missionary work in the profession, and at the same time improve the journal that you get each month.

BOOK NOTICES.

The Ophthalmoscope, A Manual for Students, by Gustavus Hartridge, F. R. C. S., London, Sixth Edition. 12mo, 160 pages, with 65 illustrations and four plates. Philadelphia, P. Blakiston's Son & Co.

A new edition of this work twenty-eight years after its first publication calls attention to the fact that no work of the kind has appeared in that time to supplant it. It gives a comparatively brief but clear account of its subject, is well illustrated, includes a good explanation of the anatomic significance of the appearances revealed by the ophthalmoscope and urges a good practical routine for using the instrument.

Two of the plates printed in fundus colors will be quite helpful to the student. The value of the other two is more open to question. It is rather surprising to find at this day no mention of the electric ophthalmoscope; and for a book to be read by American students, some account of the Loring ophthalmoscope would be more helpful than details regarding the Morton instrument, or that of Parent with cylindrical lenses. The latter was a novelty of some importance when the first edition was published, but is now of only historical interest.

The book is neatly printed and bound in a form to be readily carried in the pocket.

E. J.

BIOGRAPHIC SKETCHES

T. H. Shastid, M. D.

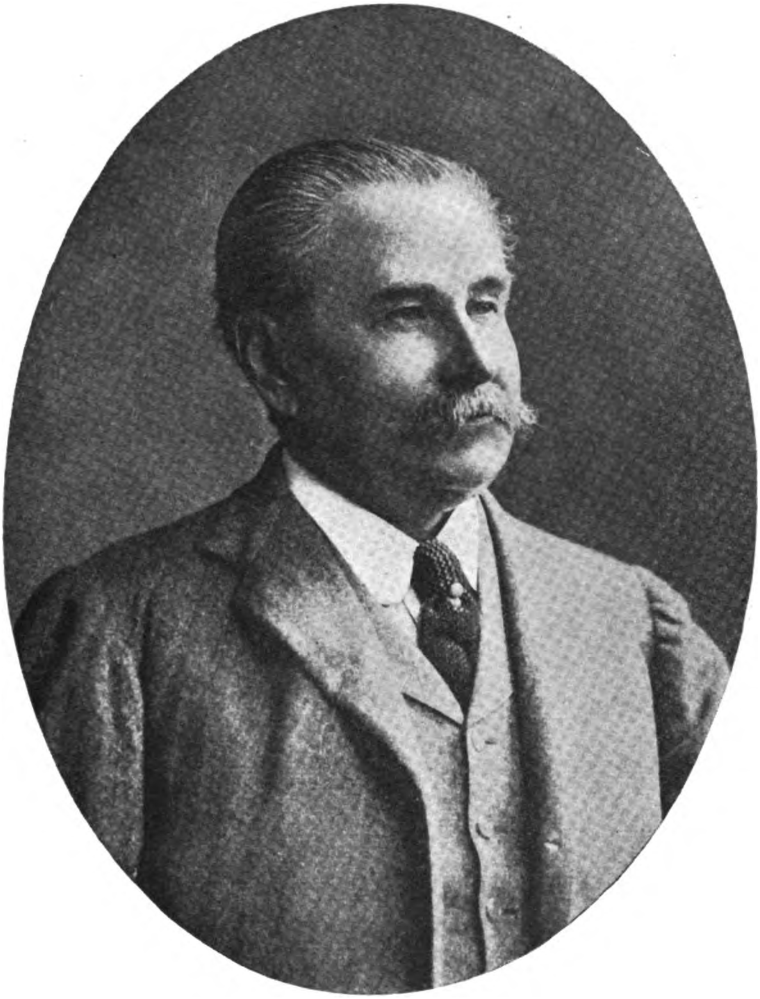
Superior, Wisconsin

Sir James Mackenzie Davidson, the English ophthalmologist, inventor of the cross-thread method of localizing foreign bodies by means of the X-rays, and the foremost radiologist of the United Kingdom, was born Dec. 6, 1856, at Estancia, Santo Domingo, Buenos Aires, son of John and Margaret Davidson. He received a liberal education at the Scotch School in that city. His medical training was had at Edinburgh, Aberdeen and London. His degrees in medicine and surgery (M. B. and C. M.) were received at Aberdeen in 1882.

For a time he was assistant in surgery at Aberdeen, but in 1886 succeeded Prof. Dyce Davidson as ophthalmic surgeon at the Aberdeen Royal Infirmary. This position he held till 1895. He was also ophthalmic surgeon to the Royal Infirmary and the

Royal Sick Children's Hospital, Physician to the Blind Asylum, etc.

In 1897 he removed to London, and from that time on devoted exclusive attention to the X-rays. He had, in fact, already, in 1896—the year after the rays were discovered—gone to Würzburg there to talk with Roentgen about his new discovery. In the July, 1897, number of the "Archives of the Roentgen Ray," he published a cut of a bladder stone radiograph, and from that time forward was one of the foremost workers in the world on the subject of radiography. He became consulting surgeon to the X-ray Department, Charing Cross Hospital; consulting surgeon in charge of X-ray Department, Moorfields; president of the Roentgen Society; president of the Radiology Section of the 17th International Medical Congress, 1913; a Fellow of the Physical Society, etc. For the last three years of the war, he was consulting radiologist to the military hospitals of the London district. He was knighted in 1912.



Sir James Mackenzie Davidson
1856-1919

Among his more important publications may be mentioned: "The Electric Light Applied to the Ophthalmoscope," Lancet, 1886; "Localization of Foreign Bodies in Eyeball and Orbit," Trans. IX Internat. Oph. Congress, Utrecht. Many of his articles appear in the Transactions of the Ophthalmological Society of the United Kingdom.

Sir James was a man of medium height and weight, with bright blue eyes, blonde mustache and hair and a very deliberate, courteous, kindly manner. All his associates were very devoted to him. He was a member of the Church of England.

In 1886 he married Georgiana, daughter of William Henderson, of Aberdeen. His abode was at 26 Park Crescent, Portland Place, W., London, where he died in April, 1919. A memorial service was held on April 7 at All Souls Church, Langham Place. The doctor is survived by Lady Davidson, a son, Mr. Colin Davidson, who is Mr. Bonar Law's private secretary, and a daughter, the wife of Dr. Bernard Potter of London.

Leonard George Guthrie. This well known London neurologist and pediatrist, who was for a time physician to the Western Ophthalmic Hospital, was born Feb. 7, 1858, the second son of Thos. Anstey, and Augusta Guthrie of Kensington. His education was received at King's College School, Magdalen College, Oxford, and St. Bartholomew Hospital, London. He was always deeply interested in ophthalmology, and was a close student of the ocular relations of neurology and pediatrics. He died on December 24, 1918, from injuries received in an accident on the previous day. He was a brother to Anstey Guthrie, author of "Vice Versa," "The Giant's Robe," etc., whose pen name is F. Anstey.

Charles H. Pixley, an optical expert, long with F. A. Hardy and Co., Chicago, was born in Millford, Michigan, Sept. 16, 1844. He invented and perfected the Hardy ophthalmometer, and other instruments, and wrote on optical subjects for the Hardy Messenger. For the last three years he had been an invalid, and died June 1, 1919.

Andrew J. Stewart, was born at Provo City, Utah, April 10, 1873, the oldest son of Andrew J., and Melissa Riggs, Stewart. For a time he was government surveyor, then school teacher, and, at length, a missionary to Germany from the Church of Jesus Christ of Latter-Day Saints. He graduated from the business department of Brigham Young University in 1895, and, in 1900, from the normal department. Entering the College of Physicians and Surgeons at Baltimore, he there received his medical degree in 1904. He married Miss Rose Young of Provo City. For a time he practiced at Mt. Pleasant, Utah, but later removed to Provo, and paid especial attention to diseases of the eye, ear, nose and throat. He practiced there until his death, May 25th, 1919, of bronchopneumonia. At the time of his death he was president of the Utah County Medical Association.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C. Volunteers are needed in other localities.

DEATHS

Dr. Benjamin F. Church, Redlands, California, died in Los Angeles, September 2nd, at the age of 61.

Dr. Charles C. Kimball, Watertown, N. Y., died at his home, August 16th, from nephritis, aged 57.

Dr. Hatton I. Jessup, Philadelphia, aged 57, died at his home from pyelonephritis, September 3rd.

Dr. Francis R. Musser, Oakland, California, died August 26th, aged 59.

Dr. A. P. Van Schevensteen, of Anvers, Belgium, died April 21, 1919, aged 71.

PERSONALS

Dr. L. M. Hurd, of New York City, announces the removal of his office to 39 East 50th Street.

Dr. A. P. Knapp, of Vincennes, Indiana, has disposed of his eye and ear hospital.

Dr. William Zentmayer, of Philadelphia, returned on August 15th after six weeks at Lake Minnewaska, N. Y.

Dr. William Campbell Posey has returned to Philadelphia after a summer spent at Watch Hill, R. I.

Dr. L. Webster Fox, of Philadelphia, has returned after a six weeks' sojourn at Estes Park, Colorado.

Dr. W. B. Lancaster, of Boston, has been spending a few weeks in San Francisco and Palo Alto.

Dr. Charles A. Pfafflin, of Indianapolis, has returned from a month's stay at the Mayo Clinic, Rochester, Minn.

Dr. A. E. Bulson, has returned from a month's outing in the mountains of Montana.

Failing to comply with the Illinois state law requirements in reporting a case of sore eyes in a baby, is said to have resulted in Dr. Frank J. Zuehlke being fined twenty-five dollars and costs.

Dr. Nelson M. Black, late Senior Consultant in Ophthalmology, A. E. F., France, announces his return to civil practice in Milwaukee, continuing his partnership with Dr. Vernon A. Chapman.

The author of the Homer Smith operation for cataract has removed his offices from Norwich, N. Y. to 276 Madison Ave., New York City. Dr. Smith has been appointed Assistant Surgeon to the Knapp Memorial Hospital.

Dr. Adolph Barkan will relate his recent experiences in Europe to the Eye, Ear, Nose and Throat Section of the San Francisco County Medical Society, on September 23rd.

Dr. H. W. Eby, of Goshen, Ill., will be assisted in the practice of Ophthalmology by his sister, Miss Ida L. Eby, recently graduated from the College of Medicine and Surgery of the University of Illinois.

Dr. Charles B. Goulden has been appointed Ophthalmic Surgeon to the Victoria Hospital for Children at Chelsea, England; and M. L. Hines Opthalmic Surgeon to the Miller General Hospital, at Greenwich.

Dr. H. A. Brown, has been appointed Clinical Instructor, and Dr. W. H. Dudley, Assistant in Ophthalmic Surgery, at Stanford University Medical School.

The estate of the late Dr. Frank C. Todd, who died about a year ago while in service, amounted to $419,171.00; inheritance tax $10,351.00.

Dr. S. Lewis Ziegler, of Philadelphia, has recently returned from Europe where he presented a communication on Artificial Pupil before the Oxford Ophthalmological Congress. He also visited the Queen's Hospital at Sidcup near London, where so much plastic surgery of the face has been performed by Major Gillies and others. In Paris he found the work of Poulard in ocular plastics and Lemaitre in nasal plastics very original and interesting.

Dr. George W. Jean, of New York City, has located at 1231 State Street, Santa Barbara, California. At the time Dr. Jean left New York City he held the position of Senior Assistant Surgeon in the eye department at the New York Eye and Ear Infirmary, with which institution he had been connected since 1909. He also was Attending Ophthalmologist to the medical department of New York University and a member of the New York Ophthalmological Society, etc.

MILITARY NOTES

A movement has been initiated by the committee of men blinded in battle to duplicate in Italy the reeducation of blinded soldiers now being carried on in France.

S. L. Thorpe, Capt., M. C., U. S. A., for the past year surgeon in charge of the Eye, Ear Nose and Throat department, Department Hospital, Manila, P. I., has been discharged from the service and has resumed practice at Clinton, Illinois.

The following have returned from Army service and resumed practice: Dr. Thomas H. Curtin, of New York (A. E. F.); Dr. August L. Beck, New Rochelle, N. Y., (A. E. F.); Dr. Ernest F. King, New York; Dr. H. V. Hubbard, Plainfield, New Jersey.

The Federal Board of Vocational Education will open a school at Vincennes, Indiana, to educate disabled soldiers in optometry and lens grinding. The municipal government will furnish classrooms while Vincennes will coöperate in instructing the pupils in mathematics and English. Only students with the equivalent of seven years' schooling will be admitted.

The Manhattan Eye, Ear and Throat Hospital has arranged a course of nine months beginning October first.

The Braille Music Club, composed of one hundred blind singers and musicians, gave a concert recently in Chicago.

A post of the American Legion composed of blinded members of the Army, Navy, and Marine Corps, has been formed with headquarters at Baltimore, and branches in other cities.

MISCELLANEOUS

The San Francisco Polyclinic and Post Graduate College will resume instruction in all the special branches of medicine and surgery on October 15th. This institution was closed as a teaching institution during the war.

According to a report issued by the American Red Cross, the abnormal number of Polish children born blind during the last three years in spite of healthy parentage, is due mainly to the malnutrition of mothers.

The Ophthalmic Seminar at the New York Post-Graduate College has attracted so many men during the last year that the course was continued during the summer months with a class of thirteen matriculates.

The Ohio State Department of Health has opened a campaign to rid Ohio of trachoma, which is especially prevalent in the counties bordering the Ohio River where the disease is believed to have spread from the mountain districts of Kentucky and West Virginia. An intensive campaign is to begin at once in Scioto County.

The Bulletin of the Belgian Ophthalmological Society is to appear twice a year; a number just issued being the first since 1914. It contains addresses by Dr. Van Duyse and a reply by Dr. Coppez, and mentions the names of members who have been taken from their midst since their last meeting: Homere C. Callaert, of the University of Gande, a victim of influenza in 1915, Rafael van Oye, in 1917, and F. Lacompte, of Gande, who died in 1918.

The Ministry of Health, London, announce that they have, after consultation with the Advisory Committee of the Welfare of the Blind, issued regulations under which, subject to the consent of Parliament, grants will be paid in aid of certain services carried on in behalf of the blind. These services include workshops, assistance to home workers, home teaching, homes and hostels, book production.

The Committee on Health and Sanitation of the Pennsylvania State Legislature has reported the amendment to the existing optometry law, so as to require a majority of the State Optometry Board of seven members to be physicians, licensed under the laws of the state and qualified to practice medicine and surgery, and that the other members of Board shall be optometrists.

At a recent conference in Leeds, England, of representatives of local authorities and other persons interested in the welfare of the blind in the North-East Division of the West Riding of Yorkshire Mr. William Harvey, who presided, estimated that there was a blind population in the district of 465, of which the majority was to be found in the Leeds area where workshops had been long carried on, and a complete system of visitation existed. The Leeds Education Committee had provided facilities for educating the blind in special schools. It was proposed to form a district committee consisting of one representative each from the West Riding Education Committee, the Leeds Education Committee, the Yorkshire Vagrancy Committee, and the several boards of guardians in the district, the Leeds Institution for the Blind and Deaf and Dumb, and the Leeds Branch of the National League of the Blind. On the proposal of a blind delegate present, it was agreed that blind people should comprise one-third of the membership of the committee. A resolution was passed urging the Government to expedite the payment of grants towards the care of the blind.

OPHTHALMIC LITERATURE

These lists contain the titles of all papers bearing on Ophthalmology received within the preceeding month. These titles are all in English, some of them modified to indicate more clearly their subjects. These subjects are grouped under appropriate heads, the succession of groups being the same from month to month. In the group the papers are arranged alphabetically usually by the name of the author in heavy-face type. After the subject of the paper (Ill.) indicates the number of illustrations. (Pl.) the number of plates, and (Col. pl.) colored plates illustrating the article. (Abst.) shows that it is an abstract of the original article. (Bibl.) tells that the paper is accompanied by an important bibliography. (Dis.) means that a discussion of the subject is published with it. Under Repeated Titles are indicated additional publication of papers already noticed. To secure the earliest possible notice writers may send copies of their papers, or reprints, to 318 Majestic Bldg., Denver, Colorado.

DIAGNOSIS.

Howard, H. J. Test for Judgment of Distance. Amer. Jour. Ophth., v. 2, pp. 656-671.

Koeppe. The Nernst Lamp. Zeitschr. f. Augenh., v. 40, p. 349.

Landolt, M. Mathematic Precision of Test-Types. (1 ill.) Arch. de Oft. Hisp.-Amer., v. 19, pp. 447-450.

Luckiesh, M. The Visibility of Air Planes. Jour. Franklin Inst., v. 187, p. 409.

Stargardt, K. Radium Emanation Rays for Adaptometer. Zeitschr. f. Augenh., v. 40, pp. 228-232.

THERAPEUTICS.

Arens. Ocular Therapy. Woch. f. Therap. u. Hyg. des Auges. v. 22, pp. 105-106.

Decker, L. Arthigon Therapy in Disease of Eye. Inaug. Diss., Jena, 1919.

Kauffmann, F. Ophthalmic Therapy in the War. Woch. f. Therap. u. Hyg. des Auges., v. 22, pp. 145-147.

Sollmann, T. Benzyl Alcohol: Efficiency as Anesthetic for Rabbit's Cornea. Jour. Pharmacol. and Exp. Therapeutics, v. 13, pp. 354-356.

Wetterer-Mannheim. Powdered Ointment. Dermat. Woch., 1919, No. 19. Abst., Woch. f. Therap. u. Hyg. des Auges., v. 22, pp. 147-148.

OPERATIONS.

Landolt, M. Site for Optical Iridectomy. (1 ill.) Arch. de Oft. Hisp.-Amer., v. 19, pp. 451-454.

Meller, J. Augenärzliche Eingriffe. (801 ill.) Wien. u. Leipzig. Josef Safar, 1918. 428 pp. 8vo.

REFRACTION.

Beckers, H. Cause of Myopia. Berl. klin. Woch., 1919, 8. Abst., Woch. f. Therap. u. Hyg. d. Auges., v. 22, p. 151.

Blegvad. Progression of Myopia. Woch. f. Therap. u. Hyg. des Auges., v. 22, p. 142.

Daly, R. R. Progressive Abnormalities of Refraction. Southern Med. Jour., v. 12, pp. 503-506.

Ginestous, E. Paralysis of Accommodation, cured by Antidiphtheric Serum. Jour. de Med. de Bordeaux, v. 48, p. 234.

Gonzalez, Jose de J. Refraction in Keratoconus. Amer. Jour. Ophth., v. 2, p. 606.

Gould, G. M. Overlooked Causes of Failure to Cure Systemic Diseases by Spectacles. Amer. Med., v. 14, pp. 539-541.

Hall, R. H. B. Eyestrain in the Submarine Service. Jour. Roy. Nav. Med. Service, London, 1919, pp. 180-183.

Harbridge, D. F. Refraction in Relation to the Conservation of Vision. Southwestern Med., v. 2, pp. 1-5.

Nordenson, J. W. Changes in Lens with Accommodation. Skandin. Arch. f. Physiol., 1918, v. 35, p. 101.

Ochl, S. Relation of Ocular Muscles and Sclera in Etiology of Myopia. Amer. Jour. Ophth., v. 2, pp. 672-676.

Raefler, J. Correction of Myopia with Telescopic Glasses and Loupes. Inaug. Diss., Jena, 1919.

Smith, H. A. America's Optical Emancipation. Scient. Amer., 120, p. 454.

Wilson, J. A. Myopia. Brit. Jour. Ophth., v. 3, p. 430.

Wolff, H. Group Experiments with the Rohr Telescopic Glasses. (2 ill.) Zeitschr. f. Augenh., v. 40, pp. 235-253.

Repeated Titles. **Landolt.** (v. 1, p. 219) Brit. Jour. Ophth., v. 3, p. 370. **Menacho** (v. 2, p. 627) Clin. Opht., v. 23, p. 429.

OCULAR MOVEMENTS.

Benjamins, C. E. Tonic Reflexes of the Ocular Muscles. Arch. Neerl. physiol., v. 2, p. 536. Abst., Zentralbl. f. Physiol., v. 33, p. 402.

Huizinga, J. G. Method of Suturing in Advancement Operation for Strabismus. Amer. Jour. Ophth., v. 2, p. 606.

Maxwell, E. M. Concomitant Squint in the Practice of the Late Mr. P. W. Maxwell. (4 ill., Bibl.) Brit. Jour. Ophth., v. 3, pp. 408-420.

Ohm. Miners' Nystagmus. Graefe's Arch. f. Ophth., v. 98, No. 1. Abst., Woch. f. Therap. u. Hyg. des Auges., v. 22, No. 28-29, p. 128.

Pichler, A. Brief Bilateral Abducens Paralysis after Influenza. Zeitschr. f. Augenh., v. 40, p. 334-337.

Tracy, E. A. Recording Conjugate Deviation Test. Boston Med. and Surg. Jour., Sept. 4, 1919, p. 299.

Valk, F. Strabismus. Amer. Jour. Ophth., v. 2, pp. 603-605.

Zentmayer. Ocular Motor Palsies as a Sequel to Influenza. (Dis.) Amer. Jour. Ophth., v. 2, p. 611.

Repeated Titles. **Castresana.** (v. 2, p. 627) Jour. Amer. Med. Assn., v. 73, p. 461. **Heine.** (v. 2, p. 306) Clin. Opht., v. 23, p. 434. **Pichler.** (v. 2, p. 628) Woch. f. Therap. u. Hyg. des Auges, v. 22, p. 107. **Sauvineau, C.** (v. 2, p. 628) Clin. Opht., v. 23, p. 379. New York Med. Jour., Sept. 6, p. 431. Jour. Amer. Med. Assn., v. 73, p. 369.

CONJUNCTIVA.

Basterra y Sánta Cruz, J. Conjunctival Tuberculosis. Plus Ultra, v. 2, p. 193. Abst., Jour. Amer. Med. Assn., v. 73, p. 947.

Blatt, N. Provocative Method for Diagnosing Eye Conditions Suspected to be Trachoma. Graefe's Arch. f. Ophth., v. 98, No. 1. Abst. Woch. f. Therap. u. Hyg. des Auges., v. 22, p. 129.

Bulley, E. C. Xerophthalmia in Rats. Biochem. Jour., v. 13, pp. 103-106.

Dubreuil, G. Vesiculo-hyaline cells and Tissues of Conjunctiva. Compt. Rend. Soc. de Biol., v. 81, p. 780.

Friedländer, F. Treatment of Trachoma. Heidelberg Diss. 1918. Abst., Centralbl. f. prakt. Augenh., May-June, 1919, p. 127.

Heed, C. R. Vernal Catarrh. (Dis.) Amer. Jour. Ophth., v. 2, pp. 609-610.

Kestenbaum, A. Primary Plastic by Partial Cauterization of Conjunctiva. Wien. med. Woch., v. 68, p. 1538.

Linder. Topography of the Embryonic Conjunctiva. (Dis.) Centralbl. f. prakt. Augenh., v. 43, May-June, 1919, p. 102.

Mayall, G. Conjunctivitis and Collyria. Jour. Amer. Vet. Assn., 1919, v. 8, p. 327.

Patterson, J. A. Tubercle of Conjunctiva. (2 ill.) Amer. Jour. Ophth., v. 2, p. 676.

Pichler, A. Koch-Weeks Conjunctivitis in War. Zeitschr. f. Augenh., v. 40, pp. 337-343.

Santos-Fernandez, J. Conjunctivitis of the Fornix. Cron. Med.-Quirurg., v. 45, p. 83. Abst., Jour. Amer. Med. Assn., v. 73, p. 800.

Shumway, E. A. Vernal Conjunctivitis: Its Treatment by Applications of Radium. Pennsylvania Med. Jour., v. 22, pp. 793-794.

Terc. 6,000 Cases of Trachoma. Centralbl. f. prakt. Augenh., v. 43, May-June, 1919, p. 98.

Young, H. Mc. C. Gonorrheal Ophthalmia and Military Service. Med. Jour. Australia, July 26, 1919, p. 75.

Xerophthalmia and Nutrition. Brit. Med. Jour., Aug. 23, p. 230.

Repeated Titles. **Hiwatari.** (v. 2, p. 628) Jour. Amer. Med. Assn., v. 73, p. 305. **Neubner** (v. 2, p. 628) Woch. f. Therap. u. Hyg. des Auges., v. 22, p. 142.

CORNEA AND SCLERA.

Andrew, F. Facial Paralysis and Corneal Ulcer. Med. Jour. Australia, July 26, 1919, p. 96.

Bluhm, K. Optochin Treatment of Serpent Ulcer in Heidelberg Clinic 1913-1916. Abst. Cent. f. p. Augenh., June, 1919, p. 128.

Erggelet. Correction of Keratoconus. Münch. med. Woch., April 26, 1916, p. 609.

Hazen, E. H. Cocain in Treatment of Keratitis. Jour. Iowa State Med. Soc., v. 9, p. 273-275.

Kraupa. Keratoconus. (Bibl.) Cent. f. p. Augenh., v. 43, pp. 81-91.

Liese, G. B. Corneoscleral Cyst with Endothelial Accumulation. Heidelberg Diss. 1918. Abst. Cent. f. p. Augenh., May-June, 1919, p. 127.

Maghy, C. Observations on Blood Staining of Cornea. (1 col. pl.) Amer. Jour. Ophth. v. 2, p. 633-636.

Moore, R. W. Hypopyon. Texas State Jour. Med., v. 15, p. 156.

Phlyctenular Keratoconjunctivitis. Med. Rec., v. 96, p. 423.

Repeated Titles. **Rothschild.** (v. 2, p. 372) Clin. Opht. v. 23, p. 433. **Sidler-Huguenin** (v. 2, p. 628) New York Med. Jour., v. 110, p. 189.

ANTERIOR CHAMBER AND PUPIL.

Cabannes. Unilateral Mydriasis. Jour. de Méd. de Bordeaux, v. 90, p. 270. Abst., Jour. Amer. Med. Assn., v. 73, p. 870.

Hoessly, H. Contraction of Pupil after Cerebral Injury. Clin. and Exp. Study. Mitt. a. d. Grenzgeb. d. Med. u. Chir., Jena, 30, p. 1.

Kempner, A. Pupillary Disturbances in Hysterical Fits. Neurol. Centralbl., 1919, 7. Abst., Woch. f. Therap. u. Hyg. d. Auges, v. 22, p. 133.

Osborne, W. A. Physiology of Aqueous Humor. J. Physiol., v. 52, p. 347.

Ruttin. Reaction of Pupils to the Faradic Current. Centralbl. f. prakt. Augenh., v. 43, May-June, 1919, pp. 93-94.

Zentmayer. Cyst of Iris. Amer. Jour. Ophth., v. 2, p. 610.

UVEAL TRACT.

Connor, A. B. Congenital Choroideremia (1 pl., 1 ill.) Amer. Jour. Ophth., v. 2, pp. 553-555.

Groenouw. Eversion of Iris. Graefe's Arch. f. Ophth., v. 98, part 3 and 4, 1919. Abst., Woch. f. Therap. u. Hyg. des Auges., v. 22, p. 148.

Jackson, E. Choroideremia. (Bibl.) Amer. Jour. Ophth., v. 2, pp. 618-19.

Mazzei, A. Action and Changes in the Iris. Arch. di Ottal., v. 25, p. 1-22.

Wessely. Bilateral Plastic Iritis with Pupillary Exudate and Lens Opacity after Grippe. München med. Woch., 1919, 9. Abst., Woch. f. Therap. u. Hyg. des Auges, v. 22, p. 106.

Acute Metastatic Ophthalmia Resulting from the Grippe. München med. Woch., 1919, No. 9.

GLAUCOMA.

Bourgeois. Role of Sclerotic in the Treatment of Glaucoma. Clin. Opht., v. 23, p. 401.

Elliot, R. H. Tonometric Values. Brit. Jour. Ophth., v. 3, pp. 426-429.

Levinsohn. Glaucoma from Pigment Infiltration of Anterior Drainage Apparatus. Zeitschr. f. Augenh., v. 40, pp. 344-349.

Lister, A. E. J. Sclero-Corneal Trephining by Elliot's Method. Indian Med. Gazette, v. 54, pp. 294-297.

Lloyd, R. I. Location of Trephine Opening in Glaucoma Subsequent to Cataract Operations. Amer. Jour. Ophth., v. 2, pp. 601-603.

McLean, W. Experimental Studies in Intraocular Pressure and Tonometry. (2 ill.) Brit. Jour. Ophth., v. 3, pp. 386-399.

Purtscher, A. Iridectomy in Glaucoma thru a Trephine Openng. Centralbl. f. prakt. Augenh., v. 43, May-June, 1918, pp. 94-98.

Santos Fernandez, J. Subconjunctival Injections of Cocain in Glaucoma Operations. Cron. Med. Quir. de la Habana, v. 45, p. 55. Abst., Jour. Amer. Med. Assn., v. 73, p. 728.

Terson, A. Good Result of Binocular Equatorial Iridectomy in Recurring Glaucoma. Soc. Francaise d'Opht., May 5th, 1919, Abst., Clin. Opht., v. 23, p. 416.

CRYSTALLINE LENS

Esser, A. Shadow Formation in the Normal Lens. Zeitschr. f. Augenh., v. 40, pp. 232-235.

Fagin, R. Difficult Extraction of Cataract. Jour. Tenn. State Med. Assn., v. 12, p. 126.

Friede. Unilateral Lamellar Cataract. Centralbl, v. prakt. Augenh., v. 43, May-June, 1919, p. 92.

Hayano, R. Power of the Lens to Neutralize Alkaline Solutions. Tokyo Igakukai, 1917, 31. No. 21. Abst., China Med. Jour., 1918, 32, 467.

Hoeve, van der. Optical Heterogeneity of Lens. Graefe's Arch. f. Ophth., v. 98, part 1. Abst. Woch. f. Therap. u. Hyg. d. Auges, v. 22, p. 127.

Kafka. Interrupted Growth Associated with Congenital Cataract. Centralbl. f. prakt. Augenh., v. 43, May-June, 1919, p. 101.

Kaspar, L. Ocular and Brain Injury from Naphthalin. Centralbl. f. prakt. Augenh., May-June, 1919, p. 117.

Lefrancois. Immediate Discission of Posterior Lens in Cataract Operation. Clin. Opht., v. 23, p. 405,

McKellar, J. A. Traumatic Cataract, Absorption without Operation. Amer. Jour. Ophth., v. 2, p. 679.

Peavler, C. M. Secondary Cataract and Method of Treating. Jour. Tenn. State Med. Assn., v. 12, pp. 122-125.

Pereyra, G. Spontaneous Subluxation of Crystalline Lens. Arch. di Ottal., v. 25, p. 23.

Savage, G. C. Resumé of Cataract Operations. Jour. Tenn. State Med. Assn., v. 12, pp. 129-136.

Small, C. P. Hereditary Cataract in Calves. Amer. Jour. Ophth., v. 2, p. 679.

Straub, M. Discission for Solution of the Lens in the Aqueous. 84 pp., 56 ill. Amsterdam, J. H. De Bussy, 1919.

Vogt, A. Genesis of Ring Opacity of Vossius. (2 ill.) Zeitschr. f. Augenh., v. 40, pp. 204-221.

Wittmer, H. Cataract Operations in the Heidelberg University Eye Clinic from 1915 to 1916. Inaug. Diss., Jena, 1919.

RETINA.

Barrett, J., and Mitchell, L. Retinal Detachment after Acetylene Gas Explosion. Med. Jour. Australia, July 26th, 1919, p. 96.

Becker, F. Arteriosclerotic Changes with Atheromatous Degeneration. Inaug. Diss., Jena, 1919.

Berg, F. Pathologic Anatomy of Exudative Retinitis. Graefe's Arch. f. Ophth., v. 98, part 3 and 4, 1919. Abst., Woch. f. Therap. u. Hyg. des Auges, v. 22, pp. 138-139.

Fernandez, F. M. Eye Symptoms in Toxemia of Pregnancy. Vida Nueva, v. 11, p. 76.

Günthner, H. Hypersensitiveness to Light: Clinical Symptoms. Dermatol. Woch., 1919. No. 15. Abst., Woch. f. Therap. u. Hyg. d. Auges, v. 22, p. 127.

Heed, C. R. Silver Wire Arteries. (Dis.) Amer. Jour. Ophth., v. 2, p. 612.

Hoeve, J. van der. Senile Degeneration of Macula and Senile Lens Opacity. Graefe's Arch. f. Ophth., v. 98, No. 1.

Igersheimer. Dark Adaptation in Disease of Optic Nerve Tract. Graefe's Arch. f. Ophth., v. 98, No. 1. Abst., Woch. f. Therap. u. Hyg. des Auges, v. 22, p. 129.

Juler, F. A. Obstruction of Retinal Vessels. Amer. Jour. Ophth., v. 2, p. 613.

Köppe, L. Pathologic Histology of the Living Retina with Embolism of Central Retinal Artery. Graefe's Arch. f. Ophth., v. 99, part 1, 1919. Abst., Woch. f. Therap. u. Hyg. des Auges, v. 22, p. 149.

Pocock, A. G. C. Albuminuric Retinitis and Pregnancy. Brit. Med. Jour., Aug. 30, p. 272.

Urra, M. Degeneration and Regeneration of Deep Ocular Membranes. The Retina. (26 ill.) (Cont.) Los Prog. de la Clinica, June, 1919, p. 225.

Wessely. Embolus of Central Retinal Artery after Grippe. München med. Wochenschr., 1919, 9. Abst., Woch. f. Therap. u. Hyg. des Auges, v. 22, p. 106.

Zentmayer. Retina Supplied Entirely from the Ciliary Circulation. Amer. Jour. Ophth., v. 2, p. 610.

Repeated Titles. **Bailliart.** (v. 2, p. 78) Amer. Jour. Ophth., v. 2, p. 616. **Hanssen.** (v. 2, p. 308) Clin. Opht., v. 23, p. 436.

TOXIC AMBLYOPIAS.

Bleich. Optochin Amblyopia. Clin. Opht., v. 23, p. 428.

Fradkine. Toxic Amblyopia from Alcohol. Clin. Opht., v. 23, p. 382.

Jamieson and Lindsay. Effects of Long Continued Dosage with Quinin on the Visual Apparatus. Jour. Royal Army Med. Corps, v. 32, No. 4, April, 1919. Indian Med. Gazette, v. 54, p. 315.

Schreiber, L. Optic Atrophy and Hemeralopia after Optochin. München med. Woch., April 26, 1916, p. 595.

Schumacher, G. Histologic Examination of the Stellate Figure of the Macula. (1 col. pl.) Zeitschr. f. Augenh., v. 40, pp. 306-320.

Ujiie. Pathologic Anatomy of Optochin Amaurosis. Corresp.-bl. f. Schweitzer Aerzte, 1918, No. 46. Abst., Woch. f. Therap. u. Hyg. d. Auges, v. 22, p. 128.

Repeated Titles. **Hensen.** (v. 1, p. 814) Clin. Opht., v. 23, p. 427. **Uhthoff.** (v. 2, p. 469) Clin. Opht., v. 23, p. 426.

OPTIC NERVE.

Fisher, J. H. Connective Tissue in Front of Disc. Amer. Jour. Ophth., v. 2, p. 612.

Hensen, H. Optic Atrophy from Tape-Worm Toxin. Zeitschr. f. Augenh., v. 40, pp. 331-334.

Schoenberg, M. J. Cerebrospinal Syphilis with Relation to the Optic Nerves. New York Med. Jour., v. 110, pp. 452-454.

Sherer, J. W. Neuroretintis after Thyroid Extirpation. Jour. Missouri State Med. Assn., v. 26, pp. 304-306.

Ruttin. Specific Energy of Optic Nerve. Centralbl. f. prakt. Augenh., v. 43, p. 105, May-June, 1919.

Zeissl, M. v. Salvarsan as Cause of Ocular and Aural Nerve Disturbances. Berl. klin. Woch., 1919, 7. Abst., Woch. f. Therap. u. Hyg. d. Auges, v. 22, p. 142.

Repeated Titles. **Hirschberg, J.** (v. 2, p. 629) Woch. f. Therap. u. Hyg. d. Auges, v. 22, p. 141.

VISUAL TRACTS AND CENTERS.

Binswanger. Psychic Blindness. München med. Woch., April 26, 1916, p. 610.

Brutsaert. Amaurosis with Intracranial Tumor. Ann. med. Psychol., v. 10, p. 300.

Eaton, E. M. Visual Perception of Solid Form (Cont.) (1 ill.) Brit. Jour. Ophth., v. 3, pp. 399-408. Abst., Amer. Jour. Ophth., v. 2, p. 613.

Fisher, J. H. Relation of Pituitary Body to Carotid. Amer. Jour. Ophth., v. 2, p. 612.

Hoeve, J. van der. Significance of Field of Vision in Relation to the Length and Endings of Nerve Fibers in the Retina. Graefe's Arch. f. Ophth., v. 98, part 3 and 4. Abst., Woch. f. Therap. u. Hyg. d. Auges, v. 22, p. 141.

Holmes, G. Cortical Localization of Vision. (10 ill.) Brit. Med. Jour., Aug. 16, 1919, p. 193.

Kulle, E. Cinematoscopy of a Moving Point. Nederl. Tijdschr. v. Geneesk., v. 2, pp. 912-916, 1919.

Mann, L. Disturbances of Space Sense of Retina: Disease in Region of Optic Radiations. Neur. Zentralbl., 1919, 7. Abst., Woch. f. Therap. u. Hyg. d. Auges, v. 22, p. 128.

Saenger, A. Cerebral Blinding from a Dorso-Cranial Wound. Neurol. Zentralbl., 1917, 7. Abst., Woch. f. Therap. u. Hyg. d. Auges, v. 22, p. 130.

Schilder, P. Hallucination. Neurol. Zentralbl., 1919, 9. Abst., Woch. f. Therap. u. Hyg. d. Auges, v. 22, p. 148.

Weizsäcker. Optical Space Sense. Berl klin. Woch., v. 40, p. 895.

COLOR VISION.

Bell, L. Types of Abnormal Color Vision. Amer. Acad. Arts and Sc., v. 13, p. 1919.

Evarts. Color Symbolism. Psychoanalyt. Rev., v. 6, p. 124.

Stenholm. Heterochromic Photometry. Skandin. Arch. f. Physiol., v. 25, p. 315.

EYEBALL.

Campos, E. Congenital Familial Anophthalmos. Brazil med., 32, p. 405.

Dimitry, T. J. Operation Relegating Enucleation to Proper Position. (2 pl.) Amer. Jour. Ophth., v. 2, pp. 653-656.

Guidote, J. Cyclopean Monster, Fused Orbits. New York Med. Jour., v. 110, pp. 459-460.

Marin Amat, M. Enucleation of the Eye. (3 ill.) Arch. de Oftal. Hisp.-Amer., v. 19 pp. 399-446.

Valois. G. Artificial Eyes. (One-eyed of War.) 224 pp. 1918, Paris, Masson & Co. Med. Jour. Australia, July 26, 1919, pp. 69-70.

THE LACRIMAL APPARATUS.

Polyak, L. Tuberculosis of Tear Sac Cured by Intranasal Therapy. Zeitschr. f. Augenh., v. 40, pp. 181-203.

Wells, D. W. Infectious Granuloma of the Lacrimal Gland. (Bibl.) Amer. Jour. Ophth., v. 2, pp. 597-600.

Wilson, A. R. Chronic Dacryocystitis; Treatment. Florida Med. Assn. Jour., v. 6, p. 45.

Repeated Titles. **Affolter.** (v. 2, p. 374) Woch. f. Therap. u. Hyg. d. Auges, v. 22, p. 107. **Hoette.** (v. 1, p. 751) Clin. Opht., v. 23, p. 421. **West.** (v. 2, p. 570) Clin. Opht., v. 23, p. 424.

LIDS.

Blaskovics, L. von. Prothesis of Lower Lid by Transplantation of a Tarsal and Conjunctival Graft from Upper Lid. Zeitschr. f. Augenh., v. 40, pp. 222-227.

Espino, J. M. Vaccinia of Lids. Rev. de med. y Cirugia, June, 1919, pp. 323-325.

Heckel, E. B. Autogenous One Piece Epithelial Grafts for the Restoration of the Eyelids: with Report of Cases. (6 ill., Dis.) Pennsylvania Med. Jour., v. 22, pp. 799-803.

Hill, A. A. Pediculi of Eyelashes. Brit. Med. Jour., Aug. 2, 1919, p. 136.

Kisch, B. An Objective Symptom after Shell Wounds: the Ear-Winking Reflex. Wien. klin. Woch., 1919, 1. Abst., Woch. f. Therap. u. Hyg. d. Auges, v. 22, p. 106.

Pockley, F. A. Epicanthus and Congenital Ptosis. Med. Press, 108, p. 128.

ORBIT.

Glauning. Changes in the Orbit in Wounds in the Head. Klin. M. f. Augenh., Jan., 1919. Abst., Woch. f. Therap. u. Hyg. d. Auges, v. 22, pp. 126-127.

Nordentoft, S. Roentgen Treatment of Exophthalmic Goiter. Ugeskrift for Laeger, 81, p. 1169. Abst., Jour. Amer. Med. Assn., v. 73, p. 874.

Plummer, W. A. Blood Picture in Exophthalmic Goiter. Minn. Med., v. 2, pp. 330-332.

Secher, K. Death under Roentgen Treatment of Exophthalmic Goiter. Nordiskt Med. Arkiv., v. 51, p. 63. Abst., Jour. Amer. Med. Assn., v. 73, p. 873.

PARASITES.

Fee, W. T. Ocular Complications in an Epidemic of Filaria Onchocerca. Calif. State Jour. Med., Sept., 1919, p. 327.

Repeated Titles. **Forbes.** (v. 2, p. 471) Amer. Jour. Ophth., v. 2, p. 617.

TUMORS.

Cysts of the Iris. Med. Rec. 96, p. 333.

Hansell, H. F. Clinical and Pathologic Report of Intraocular Tumor. New York Med. Jour., v. 110, p. 372.

Kusama, K. X-Ray Treatment of Retinal Glioma. (6 ill.) Amer. Jour. Ophth., v. 2, p. 636-650.

Lossen, H. Trauma and Malignant Tumors. Monats. f. Unfall u. Invalid., 1919, No. 2. Abst., Woch. f. Therap. u. Hyg. d. Auges, v. 22, p. 134.

Maxted, G. Pedunculated Hemangioma of Conjunctiva. Brit. Jour. Ophth., v. 3, p. 429.

Moore, F. Melanoma of Choroid. Amer. Jour. Ophth., v. 2, p. 613.

Zentmayer, W. Multiple Dermoids of Eye and Other Anomalies. Amer. Jour. Ophth., v. 2, p. 610.

INJURIES.

Bachstez. Anilin Injury to Cornea. Cent. f. p. Augenh., May-June, 1919, p. 92.

Haab, O. E. Penetrating Steel Wounds of 370 Eyes. Inaug. Diss. Schweiz. Univ., 1918.

Haughey, W. Intraocular War Injuries. Jour. Mich. State Med. Soc., v. 18, p. 477.

Hoare, W. Two Cases of Severe Injury to Eye. Med. Press, July 23, 1919, p. 67.

Jones, E. L. Maximum Physiologic Lymphatic Reaction in Penetrating Wounds of Eyeball. Jour. Amer. Med. Assn., v. 73, p. 826.

Klauber, E. Use of Magnet for Recognition and Withdrawal of Intraocular Slivers of Steel. Med. Klin., 1919, 14. Abst., Woch. f. Therap. u. Hyg. d. Auges, v. 22, p. 138.

Lauber, H. Avulsion of Iris. Wien. med. Woch., v. 68, p. 1575.
Injury to Optic Nerve of Tuberculous Eye. Wien. med. Woch., v. 68, p. 1574.
Ocular Injury. Cent. f. p. Augenh., v. 43, 1919, pp. 99-100

McReynolds, J. O. Foreign Bodies within Eyeball. Jour. Amer. Med. Assn., v. 73, pp. 818-825.

Marangoni, G. Deep Penetrating Wound of Eyeball, Self-inflicted or Accidental. Boll. d. Clin. Milan, 1919, p. 33.

Mawas. Chorioretinal Injury from Contusion. Soc. Fr. d'Opht., May 5, 1919.

Oppenheimer. Avulsion of Eyeball. Woch. f. Therap. u. Hyg. d. Auges, v. 22, p. 106.

Shoemaker, W. F. Penetrating and Perforating Wounds of Eye with Diagnosis and Treatment of Retained Foreign Bodies. Amer. Jour. Ophth., v. 2, pp. 590-594.

Stargardt, K. Suture of Torn Nasal Tear Duct. Zeit. f. Augenh., v. 40, pp. 320-323.

Thoma, A. S. Double Perforation with Iron Splinter and Siderosis. Inaug. Diss., 1919.

Whitaker, J. Subconjunctival Graft of Fascia Lata. Amer. Jour. Ophth., v. 2, p. 678.

Repeated Titles. **Valude** (v. 1, p. 704). Amer. Jour. Ophth., v. 2, p. 617.

PATHOLOGY.

Boas, H. M. Inheritance of Eye Color in Man. Amer. Jour. Physiol. Anthropol., 1919, pp. 15-20.

GENERAL DISEASES.

Barkan, H. Ocular Complications of Dengue Fever. Amer. Jour. Ophth., v. 2, p. 652.

Bolten, H. Ocular Signs in Multiple Sclerosis. Nederl. Tijdschr. v. Geneesk., May 17, 1919, p. 1749. Jour. Amer. Med. Assn., v. 73, p. 730

Eger, A. Ocular Complications in Little's Disease. Cent. f. p. Augenh., May-June, 1919, p. 107.

Espino, J. M. Ocular Hyperemia with Menstruation. Rev. de Med. y Cirurga, May, 1919, p. 311.

Giese, K., and Brückner, A. Blood Picture and Eye Disease. Graefe's Arch. f. Ophth., Pts. 3-4, 1919.

Graves, M. L. Progressive Lenticular Degeneration. Texas State Med. Jour., v. 15, p. 194.

Green, A. S., and Green, L. D. Eye Complications in Influenza. Amer. Jour. Ophth., v. 2, p. 607.

Hanke. Autosuggestion a Cause of Nervous Amblyopia in School Children. Abst. Woch. f. Therap. u. Hyg. d. Auges, v. 22, p. 150.

Hessberg, R. Crysolgan in Tuberculous Eye Disease. (Bibl.) Zeit. f. Augenh., v. 40, pp. 324-331.

Ide, C. E. Focal Infections and Nerve Reflexes as Related to Eye. Calif. State Jour. Med., v. 17, pp. 341-346.

Lauber, H. Ocular Complications of Malaria. (Dis.) Cent. f. p. Augenh., v. 43, pp. 99-101.

Neal, J. B. Lethargic Encephalitis. Arch. Neurol. and Psychiat., v. 2, p. 271.

Oloff, H. Syphilitic Brain Affections, Multiple Sclerosis and the Eye. Zeit. f. Arztl. Fortb., 1919, Pt. 4.

Penichet, J. M. Ocular Complications of Peripheral Epilepsy. (Bibl.) Amer. Jour. Ophth., v. 2, pp. 594-596.

Purtscher, A. Tuberculosis of the Eyelids and Conjunctiva. Cent. f. p. Augenh., May-June, 1919, p. 101.

Stawell, R. R. Lethargic Encephalitis. Med. Jour. Australia, Aug. 2, 1919, p. 97.

Winner, S. S. Epidemic Encephalitis. Illinois Med. Jour., v. 36, p. 126.

COMPARATIVE OPHTHALMOLOGY.

Hecht, S. Dark Adaptation in Myra Arenaria. Jour. Gen. Physiol., 1918-19, v. 1, p. 545.

Retterer, E. Tarsus and Lids of Birds. Compt. rend. Soc. de Biol., 81, p. 791.

HYGIENE.

Coblentz, W. W., and Emerson, W. B. Glasses for Protecting Eyes from Injurious Light, 1919, 25 pp., 8vo. Govt. Printing Office, Washington.

Hazell, B. W. Proposed Eye Clinic for School Children. Jour. Amer. Med. Assn., v. 73, p. 921.

Lans. School Myopia. Zeit. f. Schulges. 1919, No. 2. Abst. Woch. f. Therap. u. Hyg. d. Auges., v. 22, p. 150.

Weiss, K. E. Regulation of Light Necessary to Hygiene of the Eye. Woch. f. Therap. u. Hyg. d. Auges., v. 22, pp. 81-84.

Ziegler, K. v. Voluntary Abstinence from Stooping Posture in Prevention of Myopia in Public Schools. Woch. f. Therap. u. Hyg. d. Auges., v. 22, pp. 133-134.

OPHTHALMIC SOCIOLOGY.

Adams, A. L. Illinois School for Blind. Illinois Med. Jour., v. 36, pp. 118-122.

Calcutta Ophthalmic Hospital. Brit. Jour. Ophth., v. 3, p. 420. Lancet, Aug. 16, 1919, p. 298.

Duane, A. Eyes of Signalman. Amer. Jour. Ophth., v. 2, pp. 255-264.

Greenwood, A. Organization and Activities of the Ophthalmic Service in the American Expeditionary Forces. (2 ill.) Amer. Jour. Ophth., v. 2, pp. 565-590.

Maynard, F. P. The Calcutta Eye Hospital. Indian Med. Gaz., v. 54, p. 316.

Pearson, Sir A. Victory Over Blindness. Amer. Jour. of Care for Cripples, v. 8, No. 4.

Regulating Practice of Optometry in Wisconsin. Jour. A. M. A., v. 73, p. 785.

Schweinitz, G. E. de. Concerning the Refitting of the Blinded and the Blind. New York State Jour. of Med., v. 19, pp. 343-350.

Scotomata in Eyes of Aviators. Maine Med. Jour., v. 10, p. 22.

Wescott, C. D. Conservation of Vision and Better Ophthalmic Practice. Jour. A. M. A., v. 73, pp. 876-877.

EDUCATION, HISTORY AND BIOGRAPHY.

Biographic Notes on Fuchs, Tscherning, Landolt, and the Origin of Spectacles. Jour. A. M. A., v. 73, p. 930.

Burleson, J. H. Standardization of Ophthalmology, and Ethical Attitude to be Assumed by Members. Texas State Jour. Med., v. 15, p. 148.

Jackson, E. The Osler Anniversary. Amer. Jour. Ophth., v. 2, p. 622.

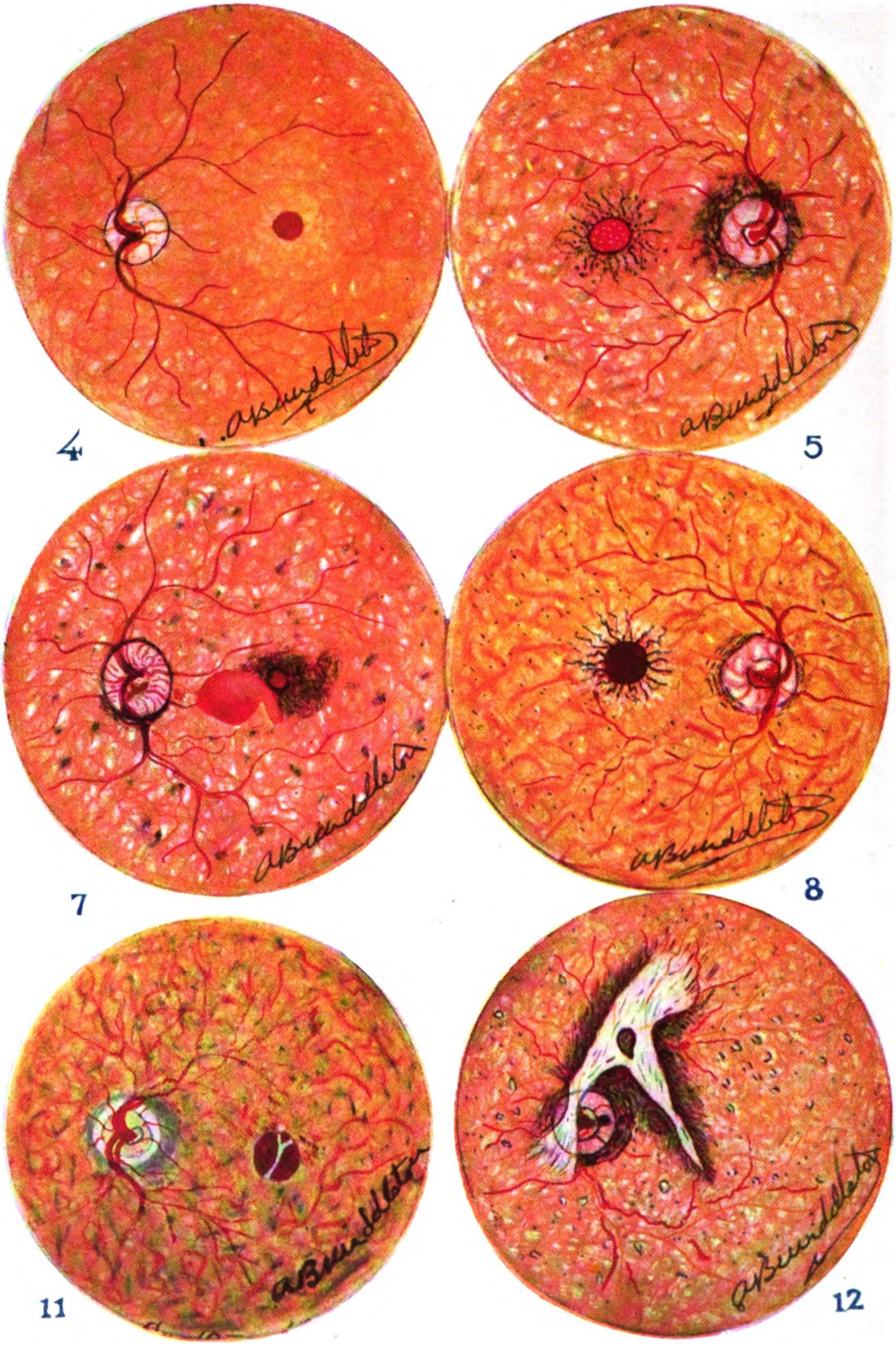
Ophthalmic Examinations. Amer. Jour. Ophth., v. 2, pp. 620-622.

Lenz, M. The University of Berlin. Cent. f. p. Augenh., v. 43, 1919, p. 92.

Ophthalmologists and the General Medical Council. Brit. Jour. Ophth., v. 3, p. 364.

Optical Institute in France. Jour. A. M. A., v. 73, p. 925.

Qualifications of Ophthalmic Surgeons. Brit. Jour. Ophth., v. 3, p. 420.



MACULAR HOLE IN THE RETINA.

THE NUMBERS INDICATE THE CASES REPRESENTED

AMERICAN JOURNAL OF OPHTHALMOLOGY

Vol. 2 NOVEMBER, 1919 No. 11

MACULAR HOLE IN THE RETINA

A. B. MIDDLETON, MAJOR M. R. C., U. S. ARMY

PONTIAC, ILLINOIS.

This paper reports 23 cases of so-called hole in the macula discovered in the examination of recruits, many of whom were suspected of malingering. These reports furnish the basis for a statistical study and indicate the frequency of a lesion heretofore supposed to be rare. Authority to publish granted by the Board of Publication, S. G. O.

Among the eye cases referred to the Special Medical Examining Board, U. S. Army, Camp Travis, Texas, during 1917 and 1918, out of 100,000 troops, twenty-three men had a hole in the retina at the macular region. Most of these men were inducted into the service as malingerers or fakers, endeavoring to avoid the draft, if possible, by claiming a dimness of vision in one eye.

The members of the local board, on inspection of the eyes, in cases of this kind find nothing abnormal, except a slightly dilated pupil. It often happens that some member of the board has known the applicant for years without being aware of the fact that the man has one defective eye; therefore the members of the board are perfectly honest in their opinion, and absolutely correct in their action when they induct such a man into the army. Many drafted men claim a dimness of vision in a normal eye to avoid the draft. All local boards have had this trick played upon them, and are to be complimented on not having taken any chances during the last few increments.

A retinal hole at the macular region is seldom seen in the practice of our busiest oculists, and is not frequent in our largest eye clinics. There are many suffering with a retinal hole at the macula, who do not know what is wrong with their weak eye, due to the fact that they have not had it examined by a doctor.

A hole in the retina, when located in the macular region, is a perfect circle as a rule, but is occasionally elliptical.

STATISTICS

Elliptical holes	4
Round holes	19
Light pink choroid	9
Dark pink choroid	14
Pigmented halo around hole	14
White exudate specks	13
White exudate specks, pigmented	8
White exudate specks, retina	10
Scotoma central	17
Scotoma of half of field	3
Pigmented choroid	12
Rupture choroid	7
Right eye	14
Left eye	9
Colored	13
White	10
Specific history	6
Scintillans	2
Detached retina	1
Dilated pupil	23
Light reaction retarded	23
Accommodation reaction retarded	23
Power of convergence reduced	23
Squint	1

In this series of cases are nineteen round retinal holes and four elliptical. The elliptical cases have a large retinal hole, the long axis of which is horizontal, as a rule, and if extended would strike the disc.

The small holes are perfectly round, due to the fact that they are contained within that portion of the retina, at the macular region, which is reduced in thickness. The retina increases in thickness from the fovea outward in all directions, offering an equal resistance to a retinal tear, confining it to this particular area; thus the circular retinal hole.

If the accident is great enough to produce a retinal tear that extends thru the thick retina at the macular area, the retinal hole usually becomes elliptical in shape, following the line of least resistance, which, as a rule, is horizontal. This does not hold true in all cases, however, there being two in this series with large round retinal holes, but it holds true in all the elliptical cases. The fact that an occasional hole in the macular region is large and round may be due to a congenitally large area of thin retina at the macular region.

The color of the exposed choroid in the bottom of a retinal hole, at the macula, varies between a light and dark mottled cherry red, and has no diagnostic value. The cases being equally divided between light and dark. The light choroids are as frequent in the white as the negro, which proves the degree of pigment in the body has nothing to do with the amount of pigment in the choroid, when exposed at the macula thru a hole in the retina.

As a rule, there is a halo of pigment in the retinal hole that varies in density. In some cases the pigment deposit is nothing more than a thin sheen, while in others it is in radiating, crooked streaks, or densely deposited patches. Four cases of this series are entirely free from a deposit of pigment, giving a picture of an arterial retinal embolism, with the exception of many small white exudative specks, seem on the surface of the exposed choroid and the retina around the hole.

The small white exudative specks seen in the most of these cases, are nothing more than the remnants of a hemorrhage that took place, in the retina, at the time of the injury. Exudative white specks are free from pigmented margins in some of the cases. This is due to the fact that in certain cases the injury did not disturb the pigment layer, consequently the deposits are free from pigmented margins. In those cases where the pigmented layer is disturbed by the injury the exudative white specks have pigmented margins, giving them the appearance of a disseminated choroiditis.

A central scotoma is present in each uncomplicated case, the size of the scotoma and the retinal hole bearing some relation to each other, the largest retinal hole showing the largest central scotoma. Four of these cases are complicated with a rupture of the choroid on the temporal side of the macular retinal hole; the field of vision in each of these cases shows the nasal half dark. The right eye was injured in fourteen cases and the left in nine; while this number is not evenly divided, it is too small to make conclusions.

There is a much higher percentage of retinal holes at the macular region among the colored than the white. In this list of cases are thirteen colored and ten white. The fact that we had five times as many whites as colored, from whom these cases were referred, must not be forgotten, proving the percentage of colored would be much higher, if the troops were equally divided. The higher percentage of retinal holes at the macular region among the colored over the whites, does not necessarily mean that the colored have a weaker retina at the macular region than the whites. True the most of them have syphilis, more than one half the cases in this list admitting a positive specific history, yet there are several things we must consider, before we come to a positive conclusion.

The colored people are careless and take more risks with their eyes than the whites; fist fighting, the throwing of stones, sticks, etc. Most colored soldiers were inducted into the service regardless of their vision; while on the other hand, we are safe in saying that a certain percentage of whites, with a retinal hole, were rejected by their local boards on the strength of reduced vision, or intraocular examination, which reduced the percentage of whites.

Taking into consideration all the facts in these cases, the writer is of the opinion there is very little, if any, difference between the white and the black race with regard to the percentage of retinal holes in the macular region, provided they were both given the same environment.

Every case in this list has a slightly dilated pupil, reacting slowly to light and accommodation, as well as a retarded power of convergence, which means nothing more than would be expected in any eye condition, with a dimness of vision, due to a central scotoma. The macular area of the retina being absent, prevents the transmission of enough light, centrally, to produce sufficient sympathetic action in the affected eye, to give it an equal pupil. The slow reaction to accommodation, is the result of the reduced central vision, which is also responsible for the slow power of convergence.

It is a remarkable fact that an injury great enough to cause a retinal hole in the macular region, seldom, if ever, causes a fluidity of the vitreous, dislocated lens, traumatic cataract, detached retina, or optic atrophy.

Cases

CASE 1. Private W. J. M. (Col.), Res. Pan Handle, Texas. Ex. Sept. 1, 1918.

History. Was kicked over the left eye by a mule, twelve years ago; prior to the injury could see as well with one eye as the other; both eves swelled shut following the accident, and could not open the eyelids for one week. The vision in the left eye slowly returned during the first month to its present strength, and has not given pain or trouble except the dullness of vision. Specific history.

Examination. Age 21 years; farmer; single. Vision R. 20/20; L. 20/200. Tension normal; left cornea clear and free from scars; aqueous clear, iris free from adhesions and pigment deposits. Pupil slightly dilated, reacting sluggishly to light and accommodation, power of convergence reduced. Lens normal, vitreous clear and not fluid. At the macular region there is a slightly depressed elliptical area, the long axis of which is equal in length to the diameter of the disc. The position of the ellipse is such, if the axis was extended, it would strike the center of the disc. The exposed choroid at the bottom of the retinal hole, is a light red raspberry color. The margin of the retinal hole has a sharply cut edge, which is free from pigment. On the surface of the exposed choroid are many small white exudative specks, one millimeter each in diameter, free from pigmented margins, giving the surface a mottled appearance. Around the retinal hole is a thin halo of pigment, one fourth the disc diameter in width. On the pigmented retina are several exudative white specks, two millimeters each in diameter, with distinct pigmented margins. The vessels and disc are normal in color and shape. The choroid is free from rupture and choroiditis. Large central scotoma.

CASE 2. Private W. B. (Col.) Age 28 years; farmer; single. Res. Grand View, Texas. Ex. July 18, 1919.

History. When sixteen years of age, was hit in the left eye with a stone, could see nothing but the light for months. Later the vision slowly returned to its present strength. Before the accident one eye was as good as the other, never consulted a doctor with regard to the eye, which has not given one moment's pain or trouble since the injury.

Examination. Vision R. 20/20; L. 10/200. The left cornea is clear and free from scars; aqueous humor clear. Iris free from adhesions and pigment deposits, pupil semidilated reacting slightly to light and accommodation. Power of convergence reduced, lens normal, vitreous clear and not fluid. At the macular region there is a slightly depressed circular area, with a diameter equal to one-third the diameter of the disc. The exposed area of the choroid at the bottom of the retinal hole is a dark cherry red color. The distinct sharply cut retinal margin is a darker red. The exposed surface of the choroid at the bottom of the retinal hole, has six or eight white exudative dots, one millimeter each in diameter, giving this surface a mottled appearance; between these dots is a slight deposit of pigment. A pigmented area extends over the retina a distance equal to the diameter of the disc, with the retinal hole in its center. Over the pigmented area of the retina, are twenty or thirty white exudative specks, one millimeter each in diameter. The margins of these specks are pigmented, very dark, giving the appearance of a choroiditis. In the non-fluid vitreous, between the disc and the retinal hole, are many cholesterin crystals. The vessels are normal. The disc is normal in shape and color. No signs of choroidal rupture or choroiditis. Large central scotoma.

CASE 3. Private J. L. H. (Col.) Age 27; farmer; married. Res. Gillsborough, Texas. Ex. July 18, 1918.

History. Hit in the right eye with a baseball nine years ago; prior to injury the vision was as good in one eye as the other, at that time the eye swelled and was very painful, but has not given the slightest trouble since; the vision slowly returned to its present strength. Has not had eye examined by a doctor.

Examination. Vision R. 10/200; L. 20/20. The cornea of the right eye is clear and free from adhesions and pigment deposits. Pupil semidilated reacting slowly to light; accommodation and convergence. Vitreous clear and not fluid. At the macular region there is a slightly depressed circular area of a dark cherry red color, the diameter equaling one-third the diameter of the disc. The distinct sharply cut retinal margin around the retinal hole is not of a darker color. There are no white specks on the surface of the exposed choroid, but there are a number of pigmented areas one half millimeter each in diameter, that give a mottled appearance to the bottom of the retinal hole. A halo of clear retina, two millimeters in width, surrounds the retinal hole, beyond this clear area is a pigmented halo one-half the disc diameter in width. In this pigmented area are many white exudative specks, two and three millimeters each in diameter, the margins of which are very black, giving the appearance of small patches of choroiditis, but are plainly seen resting on the retina. The vessels are normal, disc normal in shape and color; no signs of a rupture in the choroid, or choroiditis. Large central scotoma.

CASE 4. Private M. K., Q. M. C., Camp Travis, Texas; age 29 years; smelter; married; Res. Pittsburg, Kans. Ex. October 4, 1918.

History. Was hit in the right eye with a ball fifteen years ago while playing at school; the eye became painful and was badly swollen for one week. Prior to the accident one eye was as good as the other, but since the injury the sight has remained at its present strength, and the eye gives no trouble other than dimness of vision.

Examination. Vision R. 20/20; L. 20/200. The examination of the left eye shows the cornea clear and free from scars, aqueous humor clear, iris free from adhesions and pigment deposit. Pupil slightly dilated, reacting to light and accommodation slowly. Power of convergence reduced, lens normal. Vitreous clear and not fluid. At the macular region there is a slightly depressed circular area, with a diameter equal to one-third the diameter of the disk; the bottom of the depression is covered with exposed choroid of a light cherry color. The margin of the retinal hole has a sharply cut edge which is not pigmented. There is an absence of pigment on the surface of the exposed choroid, the mottled appearance being due to a number of white exudative specks one millimeter each in diameter. The retina around the retinal hole is entirely free from pigment deposit, but there are a number of white exudative specks two millimeters each in diameter, forming a ring around the retinal hole about three millimeters from the retinal margin. The vessels normal, disc normal in color and shape. No rupture of the choroid or choroiditis. Large central scotoma. See Plate XVIII, No. 4.

CASE 5. Private I. S. (Col.) Age 25 years; farmer; single; specific history; residence Quanah, Texas. Ex. August 22, 1918.

History. Was hit in the right eye with a clod ten years ago, could see as well out of one eye as the other before the injury; for several days following the accident, the eye was badly swollen and the lids could not be opened. For one month had only light perception, but later vision returned to present strength. The eye has not given any trouble other than a dimness of vision, and had not been examined by a doctor prior to entering the army.

Examination. Vision R. 20/200; L. 20/20. Examination of the right eye shows the cornea clear and free from scars, aqueous clear, iris free from adhesions and pigment deposits. Pupils slightly dilated reacting slowly to light and accommodation. Power of convergence retarded, lens clear and normal. Vitreous clear and not fluid. At the macular region there is a slightly depressed elliptical shaped area, the long axis of which is equal in length to three-fourths the diameter of the disc; this axis if extended toward the nose would strike the upper margin of the disc, the width is equal to one-half the diameter of the disc. The exposed choroid in the bottom of the depression is of a light cherry red color. The margin of the retinal hole is a dark red color. The surface of the exposed choroid is free from pigment but is covered with many white exudative specks, one-half millimeter each in diameter, giving a mottled appearance. Radiating in all directions from the margin of the retinal hole for a distance equal to two-thirds the diameter of the disc is a stellate formation of pigment deposit on the retina, the pigment collected in crooked lines, resembling the legs of a bug. The vessels normal, disc normal in shape and color. No rupture of the choroid or choroiditis. An absence of white exudative specks outside of the retinal hole. Large central scotoma. See Plate XVIII, No. 5.

Case 6. Private C. T. (Col.) Age 22 years; farmer; single; specific history; Res. Taylor, Tex. Ex. July 16, 1918.

History. Was hit in the right eye with a baseball four years ago, prior to the accident one eye was as good as the other; following the injury the right eye was very painful for one week with only light perception; later the vision gradually returned to its present strength; and the eye has given no pain or discomfort other than the dimness of vision. The eye had not been examined by a doctor before entering the army.

Examination. Vision R. 10/200; L. 20/20. Examination of the right eye shows the cornea clear and free from scars, aqueous clear, iris free from adhesions and pigment deposits. Pupil slightly dilated, reacting to light and accommodation. Power of convergence retarded. Lens normal. Vitreous clear and not fluid. At the macular region there is a slightly depressed circular area, with a diameter equal to one-half the diameter of the disc; the exposed choroid at the bottom of the retinal hole is a dark cherry red color. The margin of the retinal hole has a sharply cut edge, which is slightly pigmented. A slightly pigmented area, the diameter equaling the whole area, is sprinkled with exudative white specks, one and two millimeters each in diameter. These white exudative specks have distinctly pigmented margins resembling small patches of choroiditis. The disc is normal in shape and color. Vessels normal. No rupture of the choroid or choroiditis. Large central scotoma.

Case 7. Private A. M. (Col.) Age 32 years; cook; married; Res. Houston, Texas. Ex. Aug. 29, 1918.

History. Hit in the left eye with a stick ten years ago; prior to this injury the vision was as good in one eye as in the other. The eye was painful and swollen for weeks following, but later the vision slowly returned to its present strength; tried to get glasses several times but never had the eye examined by a doctor. Four weeks ago was hit in the same eye with a bottle, after which could not see anything but the light until a few days ago. Specific history.

Examination. R. 20/20; L. 10/200. The left eye shows the cornea clear and free from scars; aqueous humor clear, iris free from adhesions and pigment deposits that might suggest an old iritis. Pupil dilated, reacting slowly to light. External squint, absence of power of convergence and accommodation. At the macular region there is a slightly depressed circular area with a diameter equaling one-fourth the diameter of the disc. The bottom of the depression is covered with exposed choroid, the surface of which is sprinkled with many small pigment spots, giving a mottled appearance. Around the retinal hole on the retinal surface is a halo of densely deposited pigment. In the densely pigmented area are several small specks of white exudate, one millimeter each in diameter, but there is an absence of these specks on the surface of the exposed choroid at the bottom of the retinal hole. Between the retinal hole and the disc is a light pinkish colored subhyaloid hemorrhage, about the size of the disc, resembling a duck turned wrong side up, with its neck extending directly below the center of the retinal hole. Between the subhyaloid hemorrhage and the disc is a fresh retinal hemorrhage four millimeters in diameter. The fresh and the subhyaloid hemorrhages are the results of the last injury, while the retinal hole is the result of the first accident. No rupture of the choroid or choroiditis. Disc normal in shape and color. Large central scotoma. Tension normal See Plate XVIII, No. 7.

CASE 8. Private I. C. (Col.) Age 27 years; round house laborer; married; specific history. Ex. July 17, 1918.

History. Hit in the right eye with a stone seven years ago, prior to the injury could see as well out of one eye as the other; following the accident the eye was badly swollen and painful for several days; the vision gradually returning to its present strength. The right eye has not given one moment's trouble other than dimness of vision.

Examination. Vision R. 10/200; L. 20/20. The right cornea is clear and free from scars; aqueous humor clear, iris free from adhesions and pigment deposits. Pupil slightly dilated, reacting to light and accommodation slowly. Power of convergence reduced, lens normal, vitreous clear and not fluid. At the macular region there is a slightly depressed circular area, with a diameter equal to three-fourths the diameter of the disc. The exposed choroid at the bottom of the depression is a dark cherry color. The distinct sharply cut retinal margin is much darker, due to a deposit of pigment, around the edge of the retinal hole. On the exposed choroid are a number of pigmented specks, two millimeters each in diameter, giving the surface a mottled appearance, resembling a ripe red raspberry. A halo, one-half the disc diameter in width, surrounds the retinal hole, made up of pigment deposits in streaks radiating from the outer margin of the retinal hole like the petals of a sunflower. Among the crooked pigmented streaks are many white exudative specks, one-half to two millimeters each in diameter. There is an absence of white exudative specks on the surface of the exposed choroid. Vessels normal. Choroid not ruptured and free from choroiditis. Large central scotoma. Tension normal. See Plate XVIII, No. 8.

CASE 9. Private F. L. W., Co. F., 35th Infantry, age 24 years; farmer; single. Res. Springfield, Col. Ex. Nov. 18, 1918.

History. Hit in the right eye with a baseball fourteen years ago. Following the injury the eye was painful and badly swollen for two weeks. Prior to the injury the vision was as good in one eye as in the other. The eye has not given one moment's trouble, other than the reduction of vision. The sight in the right eye gradually returned to its present strength soon after the removal of the bandages following the accident.

Examination. Vision R. 20/200; L. 20/20. The right cornea is clear and free from scars; aqueous is clear; iris free from adhesions and pigment deposits; pupil semidilated, and reacts slowly to light and accommodation. Power of convergence reduced. Lens normal. Vitreous clear and not fluid. At the macular region there is a slightly depressed elliptical area, the long axis of which is equal to one-half the diameter of the disc. This axis if continued would pass up and in to a point one disc diameter above the disc. The transverse diameter is equal to one-third the disc diameter. The exposed choroid at the bottom of the depression, is a dark cherry red color. On its surface are five pigmented specks, one millimeter each in diameter and seven white exudative specks of the same size, free from pigmented margins. The margin of the retinal hole has a sharply cut edge with a darker color than the exposed choroid. Around the elliptical retinal hole is a halo three millimeters in width, of a light gray color, due to a detached retina, the outer margin of which is a trifle darker. Beyond the outer margin of the detached retina on the surface of the attached retina, completely surrounded by a halo, are some fifty small white exudative specks, two and three millimeters each in diameter, free from pigmented margins. In the vitreous, are five bright stationary scintillans, equally distributed.

Disc normal in shape and color. Choroid free from rupture and choroiditis. Vessels normal. Large central scotoma.

CASE 10. Private H. I. H. Age 22 years; farmer; single. Res. Brice, Texas. Ex. Nov. 9, 1918.

History. Hit in the right eye with a piece of wire when seven years of age; does not remember the accident but has been told one eye was as good as the other before the accident. Has not had one moment's pain or trouble with the eye other than reduced vision.

Examination. Vision R. 20/200; L. 20/20. Tension of the right eye normal; cornea clear and free from deposit. Pupil slightly dilated, reacting slowly to light and accommodation. Power of convergence reduced. Lens normal. Vitreous clear and not fluid. At the macular region there is a slightly depressed circular area the diameter of which is equal to one-third the diameter of the disc. The exposed choroid in the retinal hole is a light pink color. The margin of the retinal hole is sharply cut and darker red. On the surface of the exposed choroid many small white exudative specks, one half millimeter each in diameter. Absence of pigment in the bottom of the retinal hole, but on the retina toward the disc side, of the retinal hole, is a mass of exudate, covered with densely deposited pigment, giving the appearance of an apple seed, extending slightly over the retinal hole, on the side toward the disc. Around the retinal hole, and the pigmented exudate is a light halo, giving the appearance of thin choroid two millimeters in width. Directly over this area are ten or twelve white exudative specks, one and two millimeters each in diameter, free from pigment deposits. Disc appears to be elliptical in shape but this is explained by the fact that there is corneal astigmatic error of three diopters. Vessels normal. Choroid free from rupture and choroiditis. The body is covered with a severe impetigo, that has been present since childhood. No specific history. Large central scotoma.

CASE 11. Private G. L. (Col.) Age 22 years; farmer; single. Res. Beaumont, Texas. Ex. May, 1918.

History. Specific history. Hit in left eye when a baby two and one-half years old, causing the reduction of vision. Gives a history of several hard blows to the left eye, but claims the vision was poor in the left eye before they were received. Very little confidence is placed in the story of the injury claimed to have happened when a mere baby.

Examination. Vision R. 20/15; L. 20/200. Tension normal. Left eye cornea clear and free from scars; aqueous humor clear, iris free from adhesions and deposit of pigment. Pupil slightly dilated, reacting to light and accommodation slowly. Power of convergence reduced. Lens normal; vitreous clear and not fluid. Below the macular region is a slightly depressed circular area, with a diameter equal to two-thirds the diameter of the disc. The exposed choroid at the bottom of the retinal hole is a dark cherry red color, with considerable deposit of pigment, giving the mottled appearance of a red raspberry. The margin of the retinal hole has a sharply cut edge, slightly darker than the exposed choroid. A rupture of the choroid extends across the bottom of the retinal hole. The rupture is vertical, extending to the retinal margins only, exposing a strip of sclera, forked at the upper one-fourth, one millimeter in width, and free from pigment deposit. This retinal hole is directly under the fovea centralis which is covered with a speck of white exudate two millimeters in diameter, free from pigment deposit. On both sides of the fovea centralis in the retina above the retinal hole, are remnants of a retinal hemorrhage of long standing, dark red in color. Vessels normal. Choroid free from ruptures outside of the retinal hole. No choroiditis. Large scotoma in the upper half of the field. See Plate XVIII, No. 11.

CASE 12. Private M. S. (Col.) Res. Pledger, Texas. Ex. July 17, 1918.

History. Age 24 years; farmer; married; specific history; left eye has been poor all his life; does not remember having had it injured. Sight slowly left the eye without pain or trouble of any kind several years ago.

Examination. Vision R. 20/20; L. 20/200. Tension normal. The left cornea is clear and free from scars; aqueous clear; iris free from adhesions and pigment deposits. Pupil slightly dilated reacting slowly to light and accommodation. Power of convergence reduced. Lens normal. Vitreous clear and not fluid. At one-third the distance between the disc and the macular region, is a lightly depressed elliptical area, the long axis of which equals in length one-third the diameter of the disc, and if extended would pass up and in, at the angle of 10 o'clock. The transverse diameter equals one-fourth the disc diameter. The exposed cheroid in the bottom of the retinal hole is a dark cherry red. On the surface of the exposed choroid are seven white exudative specks, one-half millimeter each in diameter, free from pigment. The margin of the retinal hole has a sharply cut edge, slightly pigmented, giving the appearance of a distinct ring. The macular area is normal, free from exudate and choroiditis. A triangular mass of gray exudate extends into the vitreous from the surface of the retina in the upper nasal quadrant of the fundus. Each end of the exudate at the base of the triangle is attached to the retina along a distance equal to one diameter of the disc. One attachment below the nasal side of the disc, the other above, slightly to the temporal side. The position of the exudate causing the base of the triangle is equal in length to five disc diameters. The anterior point of the triangle is equal in length to five disc diameters. The anterior point of the triangle extends forward thru the vitreous a distance equal to the length of the base. The arm of the triangle extending forward is contracted, giving the appearance of an icicle. Near the center of the triangular exudate, extending forward is a circular hole, with a diameter equal to one-fourth the diameter of the disc. Thru the hole in the exudate can be seen the black pigment deposit on the surface of the retina, under and around the base of the triangular exudate. The exudate is in front of the retinal vessels, but there are several small vessels on the surface of the exudate. A disseminated choroiditis, with its bone corpuscle appearing as patches, extends over the whole fundus. No rupture of the choroid. Disc normal in size and color except one pigmented spot three millimeters in diameter on the temporal side of the disc extending to the edge of the physiologic cup. Field of vision shows the temporal half dark. See Plate XVIII, No. 12.

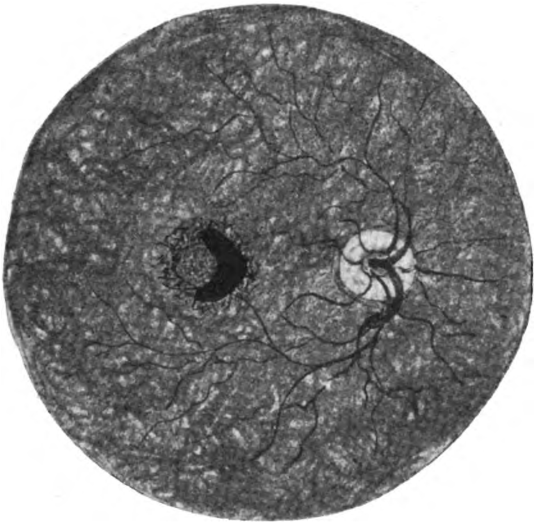
Case 13. Private A. M. (Col.) Res. Grapeland, Texas. Ex. Aug. 1918.

History. Age 24 years; married; farmer; specific history: two years ago hit in the right eye with a baseball; prior to the injury one eye was as good as the other. Following the accident the eye was painful and badly swollen for ten days; the sight gradually returning to its present strength; and has not given one moment's trouble, except the dimness of vision.

Examination. Vision R. 10/200; L. 20/20. Tension normal. The right cornea is clear and free from scars, aqueous clear, iris free from adhesions and pigment deposits. Pupil one-fourth dilated, reacting to light and accommodation slightly. Power of convergence greatly reduced. Lens normal. Vitreous clear and not fluid. At the macular region is a slightly depressed circular area, the diameter of which is equal to one-eighth the diameter of the disc. The exposed choroid at the bottom of the retinal hole is a light pink color, free from pigment and white exudative specks. To the temporal side of the retinal hole, on the surface of the retina, is a crescentic shaped exudate, deeply pigmented, three millimeters in width, that extends one-half around the retinal hole; in this same case is a crescentic shaped pigment deposit, of the same width, but free from exudate, giving a gray color. Around the macular hole, in the pigmented area is a distinct halo of white exudate and pigmented streaks, two-thirds the disc diameter in length, radiating from the margin of the deeply pigmented area at the macular region, resembling a daisy, or the picture that is often seen in cases of albuminuric retinitis. Vessels are normal. Choroid free from rupture and choroiditis. Tension normal. Field of vision shows a large central scotoma. Disc normal in shape and color.

Case 14. Private O. A. C. (Col.) Res. McLannon, Texas. Ex. Aug. 9, 1918.

History. Age 27, 1918; farmer; married. Hit in the right eye when a child, with a stone. Cannot tell when the accident occurred, but remembers the eye was painful and swollen for a number of days. Prior to the injury could see as well out of one eye as the other. Since then the eye has not given one moment's trouble except the dimness of vision.



Case 14.

Examination. Vision R. 10/200; L. 20/20. Tension normal. Right cornea clear and free from scars; aqueous clear, iris free from adhesions and pigment deposits. Pupil slightly dilated and responds to light and accommodation sluggishly. Power of convergence slow. Lens normal. Vitreous clear and not fluid. At the macular region there is a slightly depressed circular area, the diameter of which is equal to one-half the diameter of the disc. The exposed choroid at the bottom of the retinal hole is a light cherry red color. The surface of the choroid is free from pigment deposit, but is covered with small white exudative specks, one-half millimeter in width, extends one-half the circumference of the retinal hole on the nasal side; the temporal half of the circumference has a pigmented halo four millimeters in width, but much thinner. Absence of white exudative specks. Vessels are normal. Choroid free from rupture and choroiditis. Disc normal in shape and color. Large central scotoma.

Case 15. Private H. B. (Col.) Res. Nansota, Texas. Ex. Aug. 1, 1918.

History. Hit in the left eye with a bottle ten years ago; prior to the injury could see with one eye as well as the other; following the accident, eye was swollen and painful for two weeks. The vision returning to its present strength in a short time, and has not given one moment's trouble, except the dimness in vision. Did not have the eye examined by a doctor before entering the army.

Examination. Age 31 years; blacksmith; married; Vision R. 20/20; L. 10/200. Tension normal. Left cornea clear and free from scars. Aqueous clear; iris free from adhesions and pigment deposit. Pupil slightly dilated reacting slowly to light and accommodation. Power of convergence reduced. Lens normal; vitreous clear and not fluid. At the macular region is a slightly depressed circular area, the diameter equals one-third the diameter of the disc. The exposed choroid at the bottom of the retinal hole is of a dark cherry red color. On its surface are three white exudative specks one millimeter each in diameter, red from pigmented margins. No pigment deposit on the surface of the exposed choroid. Retinal margin has a sharply cut pigmented edge, making a distinct ring. Rupture of the choroid, crescentic in shape, two and three millimeters in width, four disc diameters in length, exposing the sclera. A pigmented margin of retina, four millimeters in width, on both sides of the rupture, extends vertically on the temporal side of the retinal hole, the center of the ruptured choroid opposite and separated from the temporal side of the retinal hole by a narrow band of retina, two millimeters in width. The concavity of the rupture is toward the disc. The exposed sclera is of a light gray color, due to thin pigmented exudate. Vessels are normal, crossing the rupture in several places at right angles, nonparallel with choroidal rupture. No choroiditis. Disc normal in shape and color. The field of vision shows the nasal half dark.

Case 16. Private C. D. (Col.) Res. Belton, Texas. Ex. Aug. 23, 1918.

History. Age 25 years; farmer, married; specific history. Hit in the right eye with a baseball seven years ago, prior to the accident one eye was as good as the other; following the injury the eye was painful and swollen for several days, but did not have the eye examined by a doctor. In a few days following the disappearance of the swelling, the vision returned to its present strength. The eye has not given one moment's trouble except the dimness of vision.

Examination. Tension normal. Cornea clear and free from scars; aqueous clear; iris free from adhesions and pigment deposits. Pupil slightly dilated, reacting slowly to light and accommodation. Power of convergence reduced. Vitreous clear and not fluid. At the macular region is a circular area three millimeters in diameter, slightly depressed; the exposed choroid at the bottom of the retinal hole being a very light pink color. The exposed choroidal surface is free from white exudate specks and pigment. Rupture of the choroid, crescentic in shape, one millimeter in width, three disc diameters in length, on the temporal side of the retinal hole, extending vertically exposing the sclera. The concave side of the crescent is toward the disc. The center of the crescent is opposite the retinal hole, and separated from it by a band of retina one millimeter in width. The retina is deeply pigmented for a distance of three millimeters on both sides of the choroidal rupture. Absence of white exudative specks on the retina. Vessels normal. Many arterial and venous branches crossing the choroidal rupture at right angles; none parallel with the rupture. Disc normal in size, shape and color. Large central scotoma.

CASE 17. Private H. A. H. Ex. Aug. 5, 1918.

History. Age 22 years; married; no specific history; R. R. car man; hit in the right eye two years ago with a large piece of steel; following the accident the eye was very painful and swollen, requiring bandage for more than one week. Prior to the injury could see as well with one eye as the other. The vision slowly returned to its present strength and has not given one moment's trouble outside of the dimness of vision.

Examination. Vision R. 10/200; L. 20/20. Tension normal. Cornea clear but shows a faint central scar. Aqueous clear; iris free from adhesions and deposit of pigment. Pupil slightly dilated reacting slowly to light and accommodation. Power of convergence reduced. Vitreous clear and not fluid. At the macular region there is a slightly depressed circular area four millimeters in diameter. The exposed choroid at the bottom of the retinal hole is a light cherry color, free from white exudative specks and pigment deposits. The retina is pigmented slightly, a distance of one disc diameter in width completely around the retinal hole. This pigmented area is free from white exudative specks, but there is a very dense black deposit of pigment on three sides of the retinal hole, four millimeters in width on the upper, lower and nasal side. The densely pigmented retina on the nasal side of the retinal hole also extends toward the disc eight millimeters in length, giving the whole densely pigmented area the appearance of a lobster's claw, opened. Vessels normal. No choroiditis or rupture of the choroid. Disc normal in shape and color. Large central scotoma.

CASE 18. Private J. F. R. (Mex.) Stockdale, Texas. Ex. August 29, 1918.

History. Hit in the left eye with a stick one year ago. Prior to the accident could see as well with one eye as the other: following the injury, suffered with considerable pain. The eye was badly swollen for several days, but did not consult a doctor. Vision slowly returned to its present strength and the eye has not given one moment's pain or trouble except the dimness of vision.

Examination. Tension normal. Cornea of the left eye clear and free from scars; aqueous clear, iris free from adhesions and pigment deposit. Pupil slightly dilated, reacting slowly to light and accommodation. The power of convergence reduced. Vitreous clear and not fluid. At the macular region there is a slightly depressed circular area three millimeters in diameter. The exposed choroid at the bottom of the retinal hole is of a dark cherry red color; on its surface are two small circular white exudative specks, one millimeter in diameter with pigmented margins. The margin of the retinal hole has a sharply cut edge, slightly pigmented, giving it the appearance of a narrow ring. Extending down and toward the disc from the lower edge of the retinal hole, is a rupture of the choroid twelve millimeters in length and two millimeters in width, exposing the sclera. The tear is at an angle, with the macula, equal to four on the clock dial. On each side of the rupture is a deposit of pigment in the retina, the pigmented area extending beyond the retinal hole. The rupture does not continue into the retinal hole, but to a point within three millimeters. Vessels normal, some of the smaller vessels crossing the rupture at right angles, but none directly over, or parallel to, the tear. Disc normal in size and color. Large central scotoma.

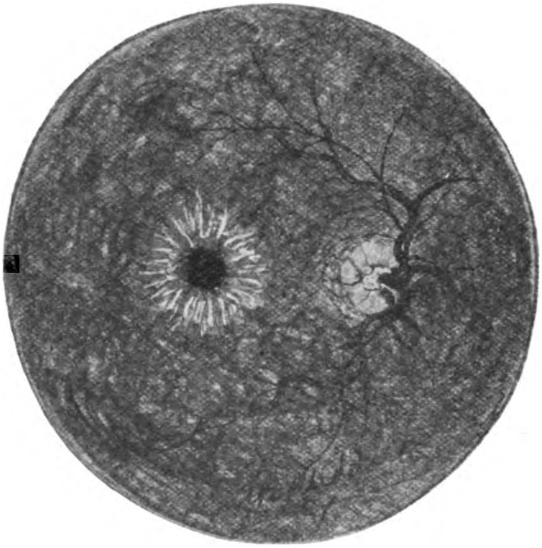
Case 19. Private M. B. (Col.) Co. 5, 165 D. B. Ex. April 2, 1918.

History. Was struck in the right eye with a stone when eight years old and has not seen well out of the eye since. Before the injury could see as well out of one eye as the other. The eye has not given one moment's trouble since, never pains or gets red and inflamed. Has not had the eye examined by a doctor before entering the army. No specific or tubercular history.

Examination. No squint. Tension normal. Right cornea clear and free from scars. Anterior chamber deep. Aqueous clear. Iris free from adhesion and pigment deposit. Pupil reacted slowly to light and accommodation. Power of convergence sluggish. Lens normal. Vitreous clear and not fluid. Disc normal in size and color. Vessels normal. No choroiditis or rupture of the choroid. At the macular region is a slightly depressed circular area. The diameter of the retinal hole is equal to one-third the diameter of the disc. The exposed choroid is a dark cherry red color covered with a fine sprinkling of pigment. The margin of the retinal hole is sharply cut and slightly increased in pigment, giving the appearance of a ring. Around the retinal hole is a halo of pigment and white exudate equal to one disc diameter in width. The pigment is deposited in streaks radiating from the margin of the hole, with white exudate between the streaks, giving the appearance of a daisy. Field of vision shows a large central scotoma. R. 1/200; L. 20/20.

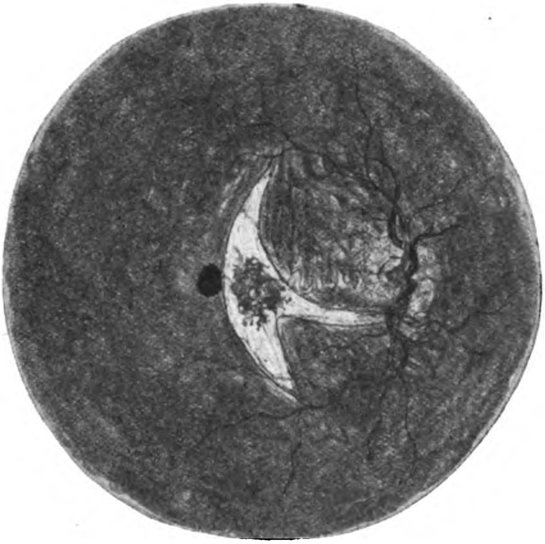
Case 20. Private A. V. Co. 6, 165 D. B. Ex. April 4, 1918.

History. Was shot behind the right eye when fourteen years old, the bullet did not strike the front part of the eye but went in at the side. At the time of the injury the eye was very painful and blind. The sight slowly returned to the present strength. The eye has not given one moment's trouble other than the reduced vision.



Case 19.

Examination. Vision R. 20/100; L. 20/20. No specific or tubercular history. Farmer; 22 years old. No squint. Tension normal. Cornea of right eye clear and free from scars. Anterior chamber deep; aqueous clear. Pupil dilated, reacting slowly to light and accommodation. Power of convergence reduced. Iris free from adhesions and pigment deposit. Lens normal. Vitreous clear and not fluid. Vessels normal. Disc normal in size and color. At the macular region is a slightly depressed circular area the diameter equaling one-fourth the diameter of the disc. The retinal margin is sharply cut and slightly pigmented, making a slight ring. The exposed surface of the choroid is a dark cherry red color, sprinkled with pigment resembling emery dust. On the temporal side of the hole is a bifurcated choroidal tear exposing the sclera. The edges of the tear are pigmented and separated two to three millimeters. On each side of the tear are two circular spots of choroiditis three millimeters each in diameter exposing the sclera. The tear is in the position of eight o'clock from the retinal hole, the bifurcation toward the upper end. The length of the tear is three disc diameters, the bifurcation beginning near the center. Several vessels pass across the floor exposed by the tear. No white exudative specks. Field shows nasal half dark.



Case 21.

CASE 21. Sgt. F. E. T., Co. C. 22, B. N. U. S. G. of Alston, Mass. Ex. Dec. 8, 1918.

History. Enlisted May 25, 1917, Ft. Slocum, N. Y. Single; waiter. Age 27 years. Hit with a stone May 28, 1918, while on rifle range at Sour Lake, Texas. Was in Camp Logan hospital 47 days. Prior to the accident one eye was as good as the other; following the injury the vision has continued to fail.

Examination. Vision R. 20/200; L. 20/20. No squint. Tension normal. Right cornea clear and free from scars. Anterior chamber deep, aqueous clear. Pupil dilated reacting to light and accommodation slowly. Power of convergence sluggish. Lens normal. Vitreous clear and not fluid. Vessels normal. Disc atrophic and elliptical, long axis vertical. The macular region shows a slightly depressed circular area, the diameter of which equals one-third the diameter of the disc. The exposed choroid at the bottom of the retinal hole is a dark cherry red color, the surface covered with a fine emery dust like pigment. The margin of the retina is sharply cut and slightly pigmented, giving a ring effect. Between the retinal hole and the disc is a large choroidal tear filled with an exudate. The tear is a semicircular affair the concavity of the tear toward the disc, the center of the tear passing near the disc margin of the retinal hole. The tear is six disc diameters in length, at the widest point one disc diameter in width. Near the center of the tear is a bifurcation down and in toward the disc beginning near the retinal hole extending to the vessels directly below the disc. Between the disc and the margin of the choroidal rupture, is a torn choroid in a worm-like shape one millimeter wide connecting the disc and the tear. A gray pigmented exudate fills the tear in the center but at each end is absent, several vessels passing over the sclera. Field of vision not taken.

CASE 22. Private N. W. (Col.) Co. 72, 165 D. B. Ex. May 9, 1918.

History. Hit in the left eye with a stone when fourteen years of age, the eye was badly swollen and bloodshot for two weeks following the accident. Prior to the injury one eye was as good as the other. The vision gradually returned to its present strength in the left eye, never giving the slightest trouble other than the reduction of vision. Never consulted a doctor or had the eye examined before entering the army.

Examination. No squint. Tension normal. Gives a specific history. Age 24 years. Single; farmer. Vision R. 20/70; L. 1/200. Left cornea clear and free from scars. Anterior chamber deep. Aqueous clear. Pupil slightly dilated, reacting to light slowly. No reaction to accommodation. Power of convergence reduced. Iris free from adhesions and pigment deposit. Lens normal. Vitreous clear and not fluid. Vessels normal. Disc normal in size and color, the macular region shows a slightly depressed circular area the diameter equaling one-half the disc diameter in length. The margin of the retinal hole is sharply cut and deeply pigmented giving the retinal margin an appearance of a distinct black ring. The surface of the exposed choroid is a dark cherry red color; is covered with a sprinkling of pigment resembling emery dust. An absence of pigmented deposit in the retina around the retinal hole as well as an absence of white exudative deposit spots. Directly below the center of the retinal hole is a rupture in the choroid extending down and in turning toward the disc making a semicircle, striking the lower border of the disc directly in the center. This rupture of the choroid follows one of the main branches of the inferior retinal vein. The rupture is five millimeters wide, exposing sclera in the center of the rupture, parallel with the long axis is a retinal vein. The rupture is not continuous from the hole in the retina to the disc; one-half the distance between the disc and the hole is an isthmus of healthy retina and choroid four millimeters in width, this point corresponds with a bifurcation of the vein. Slight pigment deposit along the line of rupture in the retina and a slight deposit smeared over the exposed sclera. Field of vision not taken. No choroiditis.

Case 23. Private G. S. (Col.) Co. 71, 165 D. B. Ex. May 9, 1918.

History. When a child six years old was hit in the left eye with a stone, the eye was swollen and painful for two weeks following the accident the vision gradually returning to its present strength. Prior to the injury could see as well with one eye as the other. Never had the eye examined by a doctor before entering the army, having no trouble other than the reduction in vision. No specific or tubercular history.

Examination. No squint; tension normal; vision R. 20/10; L. 10/200. Age 22 years; farmer; single. Left cornea clear and free from scars. Anterior chamber deep; aqueous clear. Pupil semidilated, reacting slowly to light and accommodation. Power of convergence reduced. Iris free from adhesions and pigment deposit. Lens normal. Vitreous clear and not fluid. Disc normal in size and color. Vessels normal. No rupture of the choroid or choroiditis. One-half the distance between the disc and the fovea centralis in the left eye is a slightly depressed circular area the diameter of which is equal to one-half the diameter of the disc. The exposed choroid at the bottom of the retinal hole is a dark cherry red color covered with a sprinkling of fine pigment resembling emery dust. The margin of the retina is sharply cut and deeply pigmented giving the appearance of a distinct ring, at the margin of the retinal hole. There is an absence of pigment deposit in the retina about the hole, also complete absence of white exudative specks.

HOLE AT THE MACULA

ED. E. MAXEY, MAJOR M. C., U. S. ARMY

BOISE, IDAHO.

The series of cases here reported were observed at the Base Hospital, Camp Sherman, Ohio, during 1918, in the same service as a case previously reported in this Journal, February, 1918, p. 81. Authority to publish granted by the Board of Publication, S. G. O.

An interesting series of cases of hole at the macula have been observed from among the recruit soldiers at Camp Sherman, all in young colored men, and all giving a history of an injury to the affected eye. The accompanying figures well represent the fundus condition found in two of the cases.

CASE 1. E. W., colored, private, age 22, was first seen as an out-patient, February 11, 1918, by Lieut. C. A. Burkholder, or about the time of publication of his first case. In this case there is a definite history of an injury to the right eye, evidenced by two small irregular scars on the right eyebrow. While splitting kindling some eight months before, a flying stick accidentally struck him over the right eye. The patient says that he was blind in the right eye for three months following the injury.

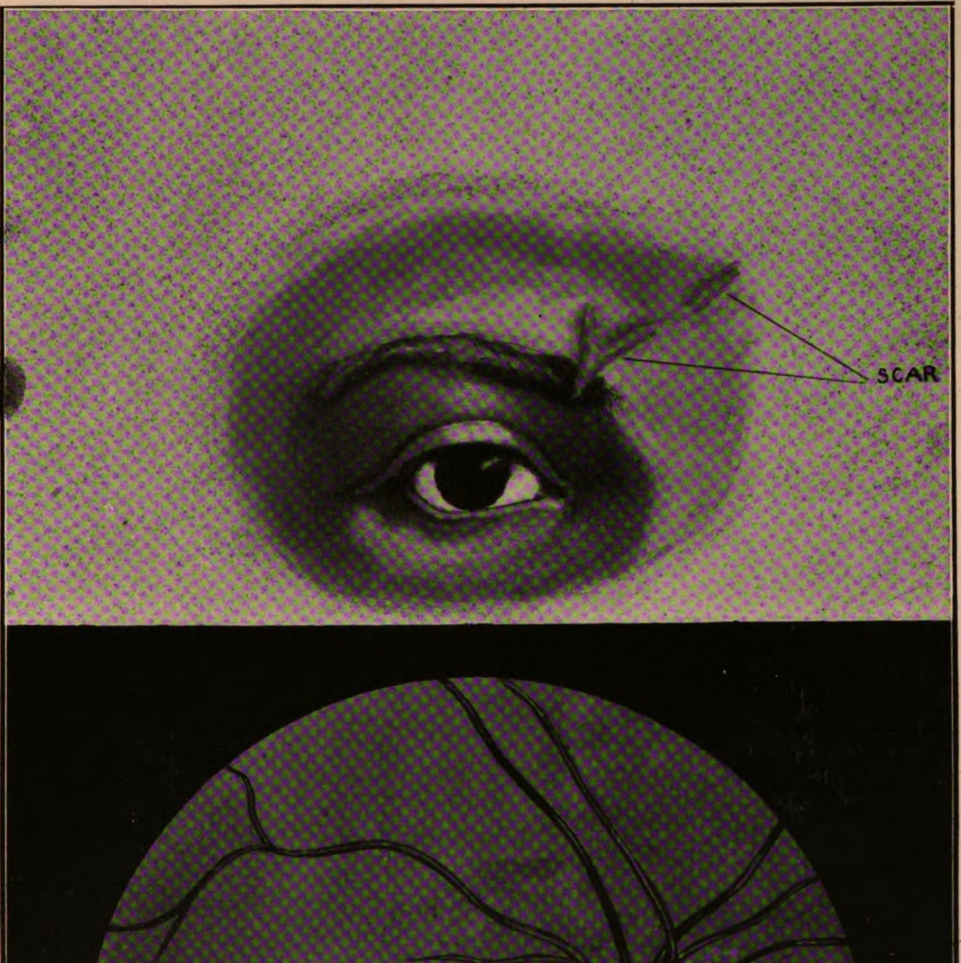
He comes to the clinic now complaining of poor vision, "slow" headache and pain in the left eye. Never glassed. Has had gonorrhea, but denies syphilis. Had typhoid fever when 15 years of age, and has had the usual diseases of childhood. Father and mother died eight years ago of consumption, and one sister died of tuberculosis 3 years ago. Has one brother and one sister living in good health. Patient is positive that before the injury to the right eye he could see equally well with either eye.

Examination. There are two small irregular scars on the right eyebrow and forehead, claimed to have been caused by the injury. See Plate XIX, upper figure. Right eye, external structures appear normal, cornea clear and smooth, anterior chamber apparently slightly deeper than the left, pupil reacts sluggishly to light, tension normal. The left eye is slightly more prominent that the right, conjunctiva slightly injected, with dusky-like induration in circumcorneal zone. Eyeball somewhat tender to palpation but tension is normal. Pupil reacts sluggishly to light. Vision: R. E. 20/200; L. E. 20/50, not improved by glassing. Wassermann blood test and urinalysis both negative. Blood count, reds 3,400,000, whites 5,100. Differential count, small mononuclear cells 20, large mononuclears 4, neutrophiles, 76.

Opthalmoscopic Examination. Right eye: Small pinhead sized opacity in the upper central portion of the lens, media clear. In the macular region is a "hole," of half a disc diameter, somewhat oval in shape, with clear margins. Base of the hole is dark red in color, slightly lower than the surrounding fundus, and has a somewhat granular appearance. Several crystals of cholesterin, and a few colloid bodies, were to be seen around the hole. Also a small colloid body at the nasal margin of the disc. Otherwise the fundus was normal. Left eye normal. See Plate XIX, lower figure.

CASE 2. J. J. H., colored, age 22, private, Co. B. Dev. Bn. No. 5. Came to the out-patient clinic for glasses to improve a long existing blindness of the right eye. Refracted on Oct. 23, 1918. There is a history of injury to the right eye some years ago but the patient does not know whether his defective vision dates from that time or not. He has worn glasses for five years, has had them changed three times in that period, the last change being about six months ago. None of the glasses improved his vision. Denies history of syphilis, and family history is negative for tuberculosis and syphilis.

Examination. Eyes steady under cover, symmetric, lids normal and tension of both eyes is normal. The pupils are equal, 3 mm., round, and react normally to light, convergence and accommodation. Irides, anterior chambers, corneas, and conjunctivae normal. Vision R. E., light perception and projection, L.



HOLE AT THE MACULA, MAXEY'S CASE I. UPPER FIGURE SHOWS CORNEAL SCAR.
LOWER FIGURE RETINAL LESIONS.

E., 20/25. Under cycloplegic, retinoscoped; R. + 1. Sph. ⊃ + 0.50 cyl. axis 90°; L. + 0.50 Sph. ⊃ +0.25 cyl., axis 120°; but no combination of lenses could be found that would make any improvement in the vision of either eye.

Ophthalmoscopic Examination. Right eye: Below and nasalward from the disc there is to be made out a limited area, two disc widths in diameter, a flat detachment of the retina, of pinkish color, which gave one the impression there was some underlying body. In the macular region there is a well-defined, roundish oval "hole," one-fourth disc in diameter, the base of which was of a granular appearance, dark red in color, and studded with cholesterin crystals. (We were unable to get a drawing of this fundus.) Left fundus entirely normal.

Case 3. E. B., colored, age 25, private, Co. D., 418 R. L. Bn., came to the eye service as an out-patient, Dec. 5, 1918, complaining of poor vision. Five years or more ago he was struck on the right eye by a baseball. There was at the time a lacerated wound just below the inferior orbital margin. Vision in the right eye he says has been poor ever since the injury, with no noticeable change in the vision. He is sure, however, that vision with the right eye was good before the injury. Patient contracted syphilis one year ago, and had gonorrhea shortly before that. No tubercular history in the family. Has had the usual diseases of childhood. Never glassed.

Examination. There is a horizontal linear scar 3 mm. long corresponding to inferior border of the right orbit. Eyes are steady under cover. Lids are normal except a very small chalazion in right upper. Tension of both eyes normal. Pupils are 2.5 mm. in diameter, round, equal, and react normally to light and accommodation. Conjunctiva of lids slightly congested and granular in appearance. Lacrimal sacs clean. General physical condition very good. Blood Wassermann one plus. Urine examination negative for albumin and sugar. The laboratory report on blood count did not give the number of red cells, but the whites were 10,500 and the differential count showed small m. 22, large m. 3, transitionals 2, eosinophiles 1, and neutrophiles 72.

Vision, R. E. 20/200; L. E. 20/20. Under cycloplegic the refractive error was found to be R. +0.50 ⊃ +0.50 cyl. axis 90°, vision not improved; and L. +0.50 sph., with no improvement.

Ophthalmoscopic Examination. Right eye media clear. In the macular region there is an oval, or pear shaped "hole" about one disc width in length, axis horizontal, and about one-half disc in width. The base of the hole is of a dark red color, granular in appearance, and studded with minute pigmentation and crystals of cholesterin. The hole is distinctly excavated, and the margins are clear cut and well defined. Entirely surrounding the hole is a band like area of grayish milky choroidal changes with a prolongation of this area from its inferior level to the disc. Seven or eight good sized crystals of cholesterin are distributed around the hole, in this area of choroiditis. Other portions of the right fundus appear to be normal. Left fundus normal.

DISTURBANCES OF VISION IN PATIENTS HARBORING FILARIAL TUMORS

R. Pacheco Luna, M. D.

GUATEMALA, C. A.

This paper, from the Department of Clinical Ophthalmology of the Medical School of Guatemala, describes a new form of corneal disease arising in patients suffering from certain filarial tumors.

In the February number, 1918, of this Journal we published a preliminary paper upon "Disturbances of Vision in Patients Harboring Certain Filarial Tumors." These disturbances we shall continue to consider as dependent on the presence in the body of a parasite, the Onchocerca volvulus, Leuckart, 1893, until Professor Henry B. Ward of the University of Illinois classifies that Filariadae otherwise, at the conclusion of his investigations upon specimens which we sent him, and which we removed from patients coming under our observation.

We will now describe a clinical form of which, up to the present, we have made no mention, and which is quite prevalent. This form of the disease has the appearance of a microcornea, the diameters of the cornea seem actually less than the normal. But unlike microcornea of microphthalmia the eyeball retains its natural size. Therefore this form has characteristics peculiar to the complaint that we have referred to under the name of Onchocercosis in our first paper.

We presume the cause of the microcornea is some toxic process acting at a distance from the location of the parasite. This is the theory that also explains the other ocular symptoms of the Onchocercosis outside the eye. In the cellular tissue under the scalp, the part of the body for which the parasite apparently has marked predilection, the filaria secretes a substance having the property of altering the adjacent tissues which, thus transformed, constitute the tumors. The secretions absorbed and conveyed by the blood thruout the organism, produce ocular lesions, sometimes apparent and at others imperceptible to the usual methods of examination.

The patients in which the microcornea is the principal or sole symptom, do not suffer an appreciable loss of vision, nor do they experience any discomfort in the eye, which might cause them to consult a physician, as the progress of the disease is insidious and there is no acute process. The picture given is that of the microphthalmia, which is the only apparent symptom; the diameters of the cornea are diminished. the eyeball retaining its normal size. The average of the diameters thus affected, measure 8 to 9 mm. This contraction of the cornea is due to a process of Keratitia Marginalis Superficialis Punctata (Fig. 1.) quite different from the Keratitis Punctata Superficialis (Fig. 2.) that we described before as a common occurrence in the Onchocercosis. In the new form which is the subject of this paper, the superficial punctate lesions are found at the limbus of the cornea; and there the grouping is so close that the uniform whitish opacity has the form of a ring of the same color as the sclerotic, and so similar that it appears to be one, there being no separating line between the two membranes. Such concentric disposition, which measures in some places as much as 2 mm., causes the reduction in the diameters of the cornea, and gives the eyeball the corresponding peculiar appearance.

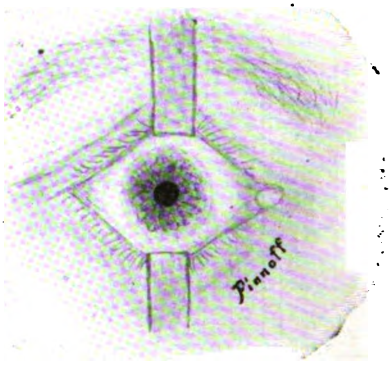


Fig. 1. Keratitis Marginalis Superficialis Punctata. (Pacheco Luna.)

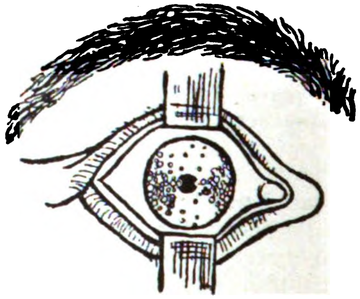
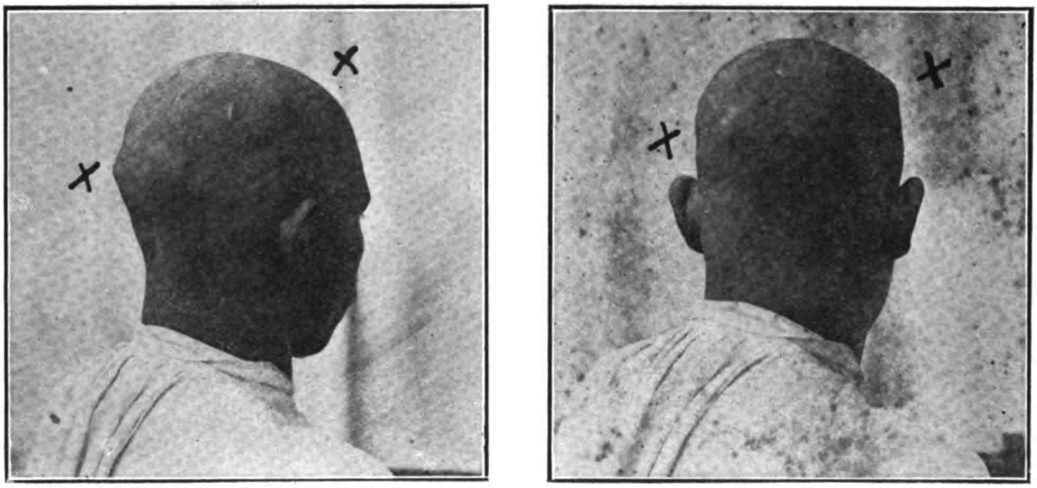


Fig. 2. Keratitis Superficialis Punctata. (Pacheco Luna.)

The examination of the eye in the dark room by reflected light, without the use of magnifying instruments reveals the opacity as being superficial and situated immediately under the epithelium from which it does not protrude. As already mentioned the dotted elements are so uniformly and compactly grouped in the scleral border that they appear to be a continuation of the same, and form a thick and perfectly opaque membrane; but where this approaches the limit of the transparent cornea, the opacity becomes less thick, the elements less compact, they decrease in number, some become isolated. But so far we have not been able to observe elements in the central region of the cornea, and therefore the part normally traversed by the light rays is not interfered with, which explains the preservation of visual acuity.



Figs. 3 and 4. Filarial tumors of scalp indicated by crosses (Pacheco Luna).

The course of the microcornea is slow and progressive; but seems to have a limit, because as we have just observed the central portion of the cornea is not affected. Up to the present moment this condition may be considered as the mildest form of the Onchocercosis. In all the cases of microcornea that have come under our notice, the patients had filarial tumors. The progress of the lesions ceases when all the tumors (Figs. 5 and 6) are removed; but this is not always possible in practice because of their location.

The clinical diagnosis is greatly assisted by discovery of the tumors. They are generally encountered in the cellular tissue under the scalp. Figs. 3, 4 and 5 show tumors of different sizes, which are very similar in appearance, consistency, shape and size to the lipomatous tumors of the scalp, with which they were confused until lately. The smallest which can be observed are the size of a grain of rice, the largest, that of an almond, and when several are located together, the size of an orange. But they are generally met with of the size of a large bean (Vicia faba, L.); and are elliptical and somewhat gibbous, having two flat surfaces, obviously attributable to the compression exerted by distended tissues upon resisting surfaces. Occasionally they are found in the body, and if they are small it is practically impossible to locate them. If they are not pressed against a bone, they have a globular shape.

The blood examination does not seem to yield any important results; Dr. Robles endeavored to find the embryos in the blood, and repeated the test several times in the 24 hours; but the result was always negative. The blood formula does not make the diagnosis more explicit, as all the patients are carriers of intestinal parasites.

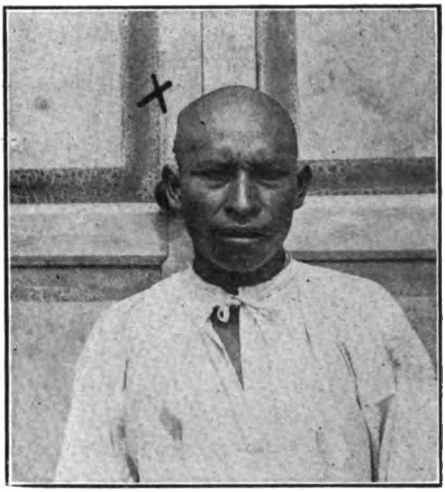


Fig. 5. Filarial tumor of scalp indicated by cross. Extreme photophobia shown by contraction of brow and partial closure of lids. (Pacheca Luna.)

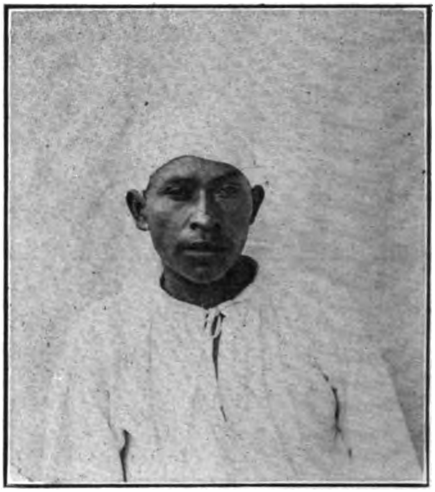


Fig. 6. The same patient as Fig. 5 after removal of tumor showing relief from photophobia.

This lesion, as well as the other ocular disturbances that we have described, yields to no other treatment than the removal of all the tumors. We have applied without result all the usual therapeutic agents, using the oral, subcutaneous, intravenous, conjunctival, subconjunctival methods of application, and also injections into the tumor itself. On the other hand the removal of the tumors gives immediate and surprising results, which are shown by comparison of Figs. 5 and 6. We affirm that no satisfactory results can be expected if tumors are left in the body.

THE SCOOP PERIMETER

S. J. Beach, M. D., F. A. C. S.

AUGUSTA, MAINE

This paper describes a new form of hand perimeter, a kind of curved campimeter, with explanation of manner of using it and charts for recording the observations made.

During the Selective Service examinations so many applicants were referred to our Medical Advisory Board for reports involving the visual fields, that it seemed imperative to devise some apparatus for this test more rapid than the regulation instruments. It was also essential to combine with speed the highest degree of completeness and accuracy.

While it often turned out that examination of the central field alone was ample, it seemed impossible to be sure of this until the peripheral field had been tested and found negative. When the examination involved only the central field, the handy little black board (hand campimeter) suggested by Dr. Peter, was, for a radius of forty degrees, both quick and accurate; but beyond this limit no short cut was available.

The importance of the outer field lies in its peculiar sensitiveness to various disorders. Its blood supply is relatively poor, and its visual elements easily disturbed. In the temporal extreme is often the first, and for a long time the only evidence of vascular trouble. In such cases its examination is of especial value.

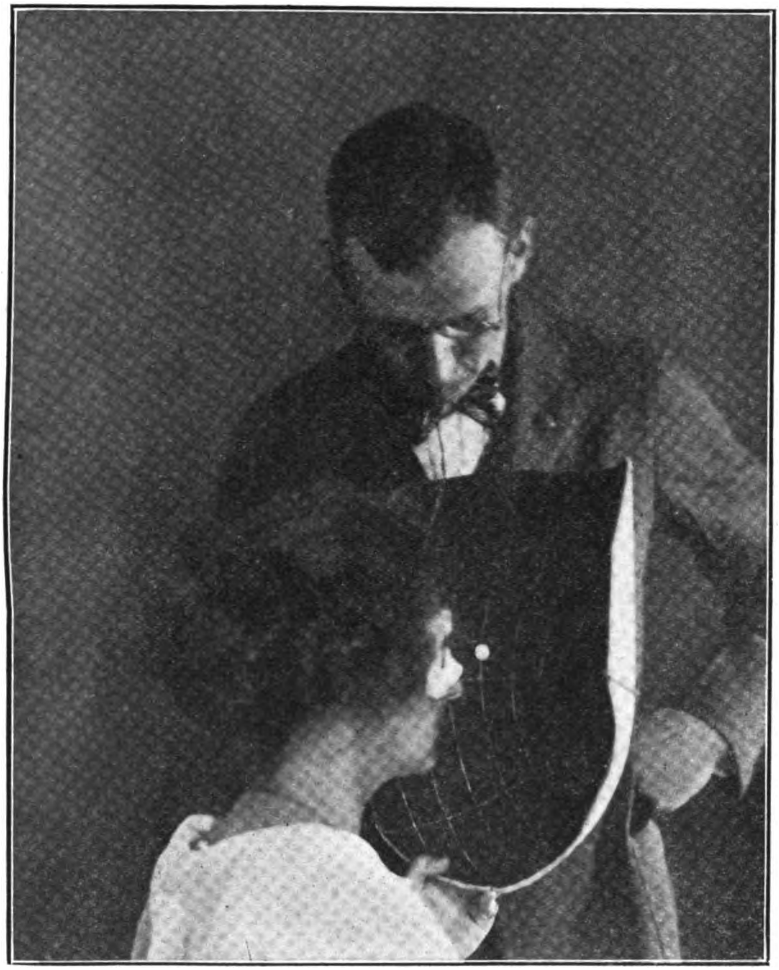


Fig. 1. Scoop perimeter of Beach, showing method of using.

The inaccuracy of the blackboard or tangent plane apparatus in the outer field is due in part to two causes. As the test object moves toward the edge of the board, its distance from the eye increases rapidly. It thus becomes relatively smaller. Hence the test is being conducted with an object of variable size. At the same time the projection of the outer field becomes correspondingly exaggerated, distorting the diagram.

Although these faults have been remedied by constructing instruments on the arc of a circle or the segment of a sphere, placing the eye at the center, it is at the expense of other essentials. The machines are slow, cumbersome and unevenly lighted. Many ingenious contrivances exist to meet these objections but are so intricate and easily got out of order that they are liabilities rather than assets.

With the idea of providing a quick, comfortable and fool-proof apparatus, which would include the peripheral as well as the central field, a blackboard was bent on the segment of a concave cylinder, axis ninety degrees. This was satisfactory except that by it the inferior field was projected on a tangent, and extended nearly double the forty degrees of satisfactory tangential projection. Changing the lower half of the instrument to the segment of a sphere corrected this defect, producing the apparatus here shown.

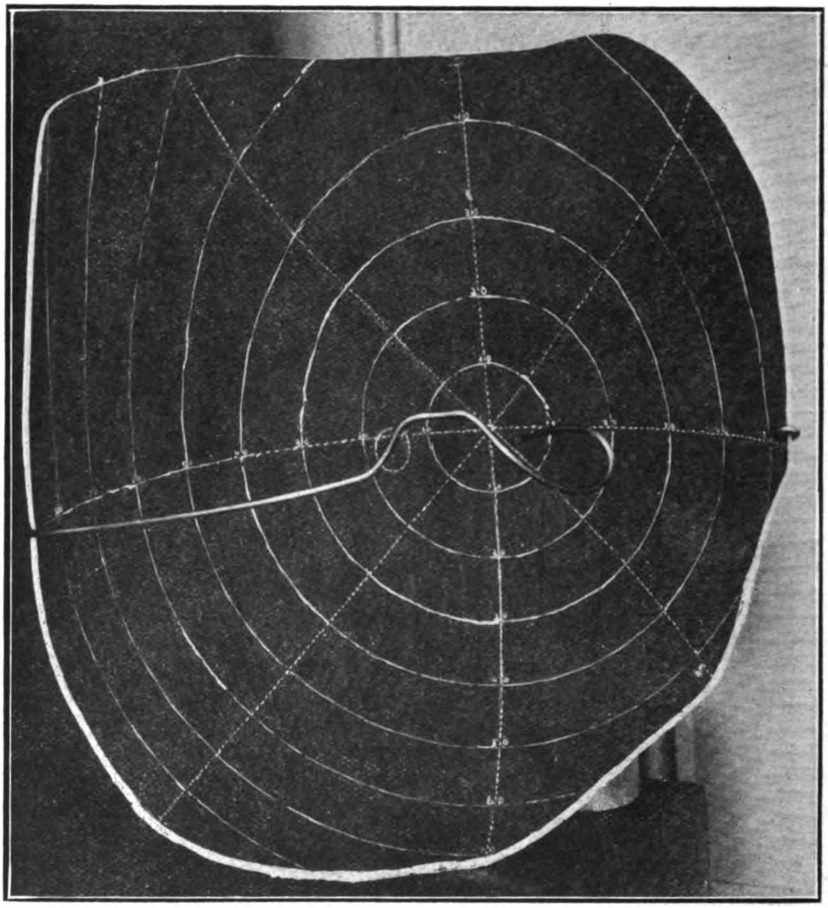


Fig. 2. Scoop perimeter enlarged to show details.

As can be seen, it is a hemispherical scotometer with the upper segment continued vertically in the shape of a cylinder. In other words, it is a scoop with the mouth up. Unlike a segment of a sphere, this cylinder has no overhanging upper lip so that a light from above and behind meets no obstacle to prevent it from illuminating the entire working surface. For all around work, daylight from a high window is best, but artificial light can be used. From above, the observer standing in front of the patient is perfectly able to watch simultaneously both the inside of the perimeter and the eye of the patient, as is essential to accurate work. The superior field is so short that within its limits the vertical meridian, tho tangent, shows no appreciable distortion.

This does away with the two objections to the hemispheric scotometer; first, the impossibility of getting uniform illumination by daylight; second, inability to observe the working surface of the instrument without getting in the light. The illumination has been further improved by cutting away all the outer part of the hemisphere beyond the limit of the normal form field. It is not even necessary to use the maximum or absolute field of Mauthner. No patient whose lesion is so trifling as not to appear within the so-called relative field is going to demonstrate anything helpful on a larger perimeter, so for clinical work this size is perfectly adequate, and makes the instrument lighter and easier to hold. Also, by indicating the limit of the normal field, it enables an inexperienced assistant to detect at once any abnormality. At first it seemed likely that the patient would suspect the meaning of the peculiar outline of the instrument and would involuntarily strive to make his field coincide with it, thereby concealing some defect. So far, however, no one has paid any attention to the odd shape.

As the fields of the two eyes are mutually reversed, a separate scoop is needed for each eye. This arrangement gives two distinct advantages. First, it is not necessary to copy off the findings for one eye before examining the second. The transfer can be postponed until some more convenient time or given to an assistant to make. Second, as the unused eye is always on the same side, a permanent ring can be attached to the head-rest to hold a sponge or other blinder. This saves the time consumed in fastening a blinder about the head over first one eye and then the other, besides allaying any apprehension felt by the woman patient for her coiffure. The head-rest, it will be noticed, loops above the eye, resting on the brow instead of underneath on the cheek. It is, therefore, not contaminated by secretion dropping from the eye. It can, of course, be either washed or boiled.

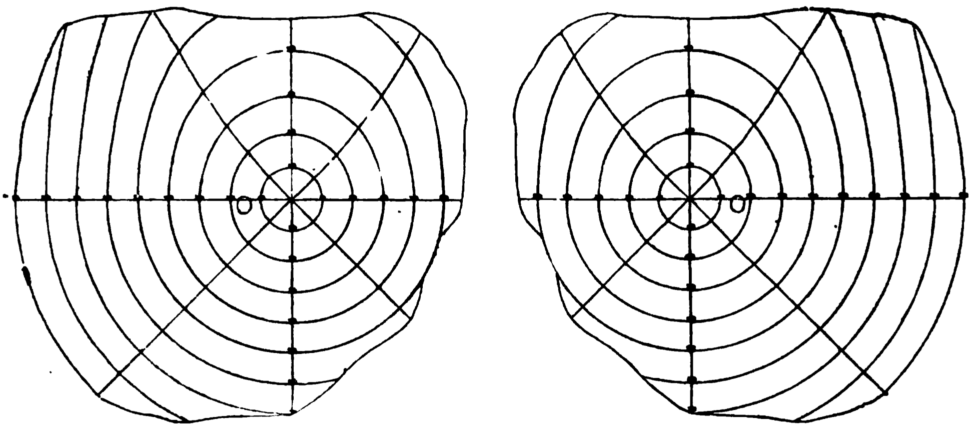

Left eye. Right eye.

Fig. 3. Chart for recording fields taken from scoop perimeter.

For convenience in transcribing, more particularly where some untrained assistant is employed, a chart has been devised, projecting the markings of the scoop upon a plane surface. The difference is so slight, however, between the marking of the scoop and that of the ordinary perimeter chart, that these special charts are not essential.

The working distance of the hand campimeter is so familiar and popular that it was selected for this scoop and the same test objects used. Any suitable material can, of course, be used in making the scoop. Aluminum seemed ideal, but during the war it was impossible to obtain special forms of aluminum, so the scoops now in use are constructed of paper laminated over a core, which is removed when the paper is dry. This produces a very light and rigid board. On the inside is painted a black surface. Eight diameters are indicated, also circles of ten degrees each, and the blind spot, all outlined with faint white lines. On the upper field the projection of the markings varies according to the diagram.

The scoop permits a complete field examination as quickly as the ordinary ophthalmoscopic examination, so that it can be performed as a routine measure in the office. The need of an instrument for this purpose seems to warrant presenting it to the profession.

OCULAR ANGIONEUROTIC EDEMA AND GLAUCOMA

HANS BARKAN, M. D.

SAN FRANCISCO, CAL.

The case here described seems to illustrate a form of glaucoma due to edema, and by the rarity of such cases raises the presumption that this is an unusual etiologic factor in glaucoma.

In reading the literature I have not found the syndrome mentioned as in the above title. In fact, except for the familiar lesions of the lids, there appears but one reference regarding implication of the eye itself in this disease. It seems not amiss, therefore, to report a case of unmistakable angioneurotic edema of the globe, which evidenced its existence also by attacks of glaucoma. In connection with this case, some speculation regarding the causation of glaucoma naturally arises.

Case.—Mrs. C. K., age 52, referred by Dr. H. I. Wiel. Past history: Seen in 1913 by Dr. Wiel complaining of swellings of different parts of the face, which had become more frequent since 1910, at which time they had first appeared; accompanied by ocular symptoms which she described as severe and sudden ocular pains, clouding over of all objects, haloes about lights, and intense headaches. She also had had epigastric pain and vomiting, sometimes with blood, one-half hour after eating. In 1911 appendectomy was done. For a month past she has been afflicted with swellings back of the ears or on the eyelids, or lip, or around the nose, and even on the hands. These appear suddenly and grow to such size in a short time as to disfigure her. They gradually disappear in the course of five to six hours. They usually appear in the morning when she awakens, are hard, and brawny, burn and itch. They annoy and worry her. Her stomach symptoms, as detailed, are constantly present. Further history, for which I am indebted to Dr. Wiel, states that on exploratory laparotomy, the stomach was found normal, and the gall bladder distended by thick, almost black, bile. There were adhesions to the duodenum from gall bladder region. The duodenum was constricted by a band of old, firm adhesions. When the intestines below collapsed, this band was released, and the gall bladder drained. She was dismissed from the hospital in three weeks.

When I first saw her, in 1915, she was in splendid health except for the attacks of facial angioneurotic edema, which were almost invariably complicated by the ocular complaints already mentioned. As to these, her history follows: In 1911, she consulted Prof. Hess, of Munich, regarding some occasional obscuration of vision, occurring more frequently in the right eye, without pain, injection or headache. Prof. Hess ordered an increase in her spherical correction, gave drops to be used five times a day, and a drop once at night, the latter fluid, as patient states, turned pink in color. The daughter states that these drops made the pupils very small. Prof. Hess diagnosed the case as one of glaucoma.

Six months later she consulted Prof. Hirschberg, of Berlin, who also diagnosed glaucoma and told her to continue the treatment. This she did regularly until 1913, when she discontinued the drops. While using them she had at no time obscuration of vision, altho she was bothered somewhat by attacks of angioneurotic edema.

On the occasion of her first visit to me, her lower lip, five minutes after seeing her, increased to three times its normal size within a period of ten minutes. Her pulse rose from 79 to 102; she felt warm, confused and embarrassed, and started a profuse perspiration. When I examined her two hours later, she was quite normal in mind and body.

Ocular Examination.—External negative. Cornea clear, anterior chamber, both eyes, quite shallow. Iris deep brown color, speckled with small melanomata. Pupils normal size, round, equal, react promptly to light and accommodation. Fundus shows a slight hyperemia of both discs, veins slightly larger in comparison with arteries than usual, but both well within limits of normal variation, considering also her hypermetropia of 5 D. Fields taken on Bjerrum's chart absolutely normal, no indication of relative Bjerrum's scotoma or Seidel's sign. Vision right and left with correcting glasses of plus 5 sphere with plus 1.00 cylinder axis 90° equals 10/10. Tension right and left, Schiötz tonometer, 24 and 36 mm.

She was told that no positive diagnosis could be made from this examination and that she should telephone upon the first appearance of any obscuration of vision. A week later I saw the first acute congestive attack she had ever had. The tension was plus 3, the cornea steamy, diffuse marked congestion of the entire bulbar conjunctiva, anterior chamber almost abolished, severe headache with pain shooting down to the tip of the nose and to the teeth on the right side. Vision counting fingers at two feet. This attack started at 7:30 a. m., when she awakened with a greatly puffed-up lower lip.

The left eye was normal. Repeated instillations of eserin, and leeches applied to the temple brought her eye to normal tension; and, except for some remaining congestion of the ocular conjunctiva, to nearly normal appearance late that afternoon. Both eyes were kept under eserin for the next three days, and the usual adjuvant glaucoma treatments followed.

Seen in the office at that time, her eye was normal except for some slight congestion of the conjunctival superficial vessels, and vision was again 10/10 with normal fields and fundus.

Following this attack, I saw her eight times during the year, each time with a rise of tension varying between 35 and 40 mm. Hg. with Schiötz' tonometer, the attacks occurring invariably within half an hour after the angioneurotic edema of her lower lip, combined, occasionally with an edema of the cheeks and tongue.

During these attacks her vision dropped to 2/10 or 3/10 of normal. The field, however, did not suffer. The eye was sensitive on pressure, the anterior chamber almost absent, and the cornea slightly steamy. The attacks would invariably disappear in from three to five hours upon instillation of eserin. The angioneurotic edema would seldom last longer than an hour.

During the next year I did not see the patient again, but heard thru friends that she was completely cured, suffering neither from the edema nor from the eye condition, and that this cure had been brought about by Christian Science! In the following year, 1917, she came to the office complaining that her glasses were not strong enough for her. I found distant vision as before with her previous glasses and added the necessary presbyopic correction. Upon questioning her regarding her former troubles, she told me that during the last year and one-half she had not had a severe attack of angioneurotic edema or of obscuration of vision. She had stopped using all medicines and had devoted herself entirely to the teachings of Christian Science. Her vision during this last visit was 10/10 right and left; normal fundus and normal field. I have heard indirectly regarding her condition in the course of the last month and it is said to be the same.

The case summed up then, is as follows:

1. Typical attacks of angioneurotic edema.

2. History of gastrointestinal attacks simulating peptic ulcer, probably angioneurotic visceral edema.

3. Diagnosis of glaucoma in 1911 by Prof. Hess and Prof. Hirschberg; miotic treatment irregular.

4. Acute attack of glaucoma in connection with angioneurotic edema of lip observed personally.

5. No permanent functional ocular involvement or anatomic change from 1911 to 1918.

The association in the same individual of typical attacks of angioneurotic edema and glaucoma does not necessarily place the latter in relation with the former; when, however, the glaucoma in its acute manifestations occurs synchronously with the edema, disappears with the latter's disappearance or shortly afterwards, never lasting more than a few hours, has occurred in this fashion for seven years and has left no deleterious results; in other words, is a sudden, self-limited rise of tension, never lasting long enough to cause anatomic impairment, the angioneurotic character of the attack may be admitted.

The localization of the edema in the choroid, ciliary body, and iris, mainly, I believe, in the ciliary body, is a unique occurrence. Unusual manifestations, such as the cases reported by Bogart, of acute intestinal obstruction due to localized edema, and a case of Sanforth and Mathews of similar nature. W. J. Mayo, in three cases opened the abdomen to find localized exudative changes, all the patients recovering rapidly. The genitourinary tract is involved to some degree in about 30 per cent of all cases.

Finally, the only reference regarding ocular implications, a case cited by Albrecht, whose patient was an eighteen-year-old girl, whom he had had the opportunity of observing since the age of thirteen. With every menstrual period, which was very painful and protracted, and prostrated the patient, the right side of the face would suddenly become intensely edematous and this condition would recur repeatedly during the menstrual period. She complained of spots of light before her eyes. Fundus examination by Birch-Hirschfeld showed repeatedly marked edema of both discs which was not present in the intermenstrual period.

The case reported by me gives food for thought. Without going into the many theories regarding the causation of glaucoma, it nevertheless directs attention once more to Fischer's theory of edema caused by localized acidosis as the explanation of glaucoma. As far as I could find in the study of his chapter relative to this, he regards edema as the cause of all glaucomas, with the usually accepted causes or combinations of causes secondary. This case I do not believe to be confirmative of Fischer's opinion; but rather one in which the exception proves the rule in the proper understanding of that maxim.

Why in the many reported cases of angioneurotic edema have we not heard before of such a case as is here reported? If the edema is a localized acidosis and if glaucoma be that, it would be reasonable to suppose that an individual so afflicted with acidosis as to be subject to angioneurotic edema, would also frequently be a sufferer from acute congestive glaucoma. Yet, a thoro search has not revealed this to be the case in a single instance other than the reported case. Is the excretion of acid bodies altered during attacks of angioneurotic edema? Miller and Pepper, in metabolic studies of angioneurotic edema, by estimation of the total acidity and ammonia excretion in the urine, found that they were not. Colonel Smith, using Fletcher's method of establishing acidosis, among 1,200 troops in India, found the normal limits to vary greatly, and states that many of his glaucoma patients fall well within these normal limits established for strong, healthy men.

It seems too much to suppose, in view of the well recognized causes of certain classes and cases of glaucoma, that all these causes should only be favoring factors to the localized edema which raises the ocular tension. Are hyperopia, old age, stiffening of the sclerotic, relatively disproportionate increase of lens volume, fibrosis of the ligamentum pectinatum, high blood pressure, arteriosclerosis and sudden mental excitement all only secondary to a local acidosis, or only an aid in its appearance in a type case of this kind? Is acidosis only a phenomenon of middle or old age—the age of glaucoma? Not at all! One frequently sees particularly severe cases of real acidosis in infants, and children, but with no glaucoma as yet reported.

And where is the edema in diabetes? Of all diseases characterized by an acidosis in its grave forms, there is the one—and where is the edema? And where does one find *hypotony* of the eye most marked? In the final stage of this same nonedematous, highly-acid state! The prompt action of miotics, especially in the case reported, is hard to reconcile with the hydrophilic theory.

If an intraocular acidosis caused the sudden and internal congestive attack, the mere mechanical opening for the normal exit of normal fluid by removing the root of the edematous iris from the chamber angle would scarcely be expected to influence the acid state of the eyeball, and continuing in the degree that supposedly caused the attack, would surely not be influenced by eserin; as little as the bull's eye in acid solution could be kept from rupturing by eserin. There is simply no clinical evidence of the existence of such an intraocular acid state.

Elliot, in his textbook on glaucoma, a most thoughtful, sincere and just appreciation of the entire subject, allows himself to say only, "It is conceivable that the morbid conditions we are describing may favor that presumed state of hydrophyllism on which Fischer and his school lay so much stress," and, "The influence of hydrophyllism can, however, only be accepted with hesitation and reserve."

The objections to Fischer's theory could be carried on at length. The results, favorable and unfavorable, of operative treatment, carry perhaps the strongest objections to the mind of the clinician. Why do certain cases respond well to operative proceedings, others not at all? All of us with a liberal experience in glaucoma operations know that irrespective of the type of glaucoma, age, sex, blood pressure, urine or other clinical findings; and with equally skillful operation in all, we can divide the end results into one group that remains stationary, for long periods at least, and one group that fails in steady progression as if no operation had been performed, fail with operation, with miotics, with any kind of treatment. In the successful group, I believe that the cause lies in the anterior chamber. We touch this by operating. In the unsuccessful, it lies in the posterior half and we do not touch it by operating. Were a state of acidosis the inciting and prime agent in all glaucoma such groups as result of treatment would scarcely be expected.

BIBLIOGRAPHY

1. H. Smith. Acidosis and edema in its relation to glaucoma. Arch. of Ophthalmology, vol. 45, 1916.
2. A. Knapp. The Medical side of Glaucoma. Arch. of Ophthalmology, vol. 45, 1916.
3. Priestley Smith. Ophthalmic Review, p. 5, 1911.
4. Priestley Smith and Snowball. Royal London Ophth. Hosp. Rep., vol. 15, 1903.
5. Bradburne. Ophthalmic Record, p. 169, 1909.
6. Albrecht. Deutsche Zeitschrift für Nervenheilkunde, vol. 47-8, 1913.
7. Roth. Deutsche Zeitschrift für Nervenheilkunde, vol. 52, 1914.
8. Fischer. Oedema and Nephritis.
9. Bogart. Annals of Surgery, p. 325, 1915, vol. 61.
10. Osler and McCrae. Modern Medicine, vol. 5.
11. Danforth. Interstate Medical Journal, p. 812, 1916.
12. Wiel. Journal A. M. A., vol. 57, 1912.
13. Henoch. Berliner klinische Wochenschrift, 1874, no. 51.
14. Briggs. Journal A. M. A., February, 1918, p. 528.
15. Matthews. Northwest Medicine, vol. 16, 1917.
16. Miller and Pepper. Arch. Int. Med., 1916, p. 550.
17. Quincke. Wochenschrift für practische Dermatologie, July, 1882.
18. Elliot. Glaucoma.

OPHTHALMOLOGIC PARIS

MAJOR CHARLES A. BAHN, M. C., U. S. A.

NEW ORLEANS, LA.

This account of what has been done and planned for the immediate future, in the way of graduate teaching in ophthalmology in Paris, is published under authority from the Surgeon-General's Office, U. S. A.

With the return of civilian transportation facilities, the beauty, charm and location of Paris, combined with its great teaching and clinical facilities, will attract more than ever before American ophthalmologists, as clinic visitors and for definite postgraduate study.

Before the war, didactic and clinical French courses were given in our specialty at the Hotel Dieu (University of Paris), by Professor de Lapersonne and staff, as well as at the hospitals Lariboisiere, Necker, Enfants Malades, Laennec and Rothschild, by Doctors Morax, Magitot, Poulard, Rochon-Duvigneaud and Dupuy-Dutemps. These included external diseases, ophthalmoscopy, operative and laboratory technic, pathology, diagnosis, etc. They offered the postgraduate students excellent and practically continuous instruction from November to May. With modifications, these courses are being resumed.

A movement is now in progress to organize postgraduate medical teaching in English and other languages. Should the number of students justify, it is probable that by 1920, one will be able to obtain didactic and clinical ophthalmologic instruction in our language sufficient to justify the trip from an educational standpoint.

There is no reason why Paris should not be the future ophthalmologic capital of Continental Europe. It has the teachers, the clinics and the facilities. Lacking only is the teaching organization, which is now in the process of formation.

The Army Educational Commission has made it possible for many in the service to avail themselves of the educational advantages of France. In this city ophthalmologic instruction was arranged at the hospitals Lariboisiere, Grand-Palais, Hotel Dieu, Enfants Malades, etc.

The important and difficult work of bringing Franco-American medical educational facilities into closer contact has been under the direction of Colonel Samuel Lloyd, of the Medical Corps, U. S. A. The future success of Paris as a postgraduate medical center for Americans will in no small way be due to his untiring and efficient efforts.

The city has largely returned to its pre-war appearance and habits. Current prices are, however, a constant reminder of the new era. Bare living expenses at this time cost the average American officer about $150.00 per month, and incidentals from $50.00 upward. Diagnostic instruments are expensive and difficult to obtain, hence it is advisable to bring ophthalmoscopes, etc. Naturally, a knowledge of French is most desirable; tho at most of the hospitals some member of the staff speaks English.

The following information concerning the several eye clinics, which, with the exception of the Rothschild Foundation, form a part of general hospitals, is given to assist prospective visitors in making necessary arrangements and employing their time to the greatest advantage.

HOTEL DIEU

Place du Paris, Notre Dame. Subway Station, Métro. "La Cité."

Professor F. de Lapersonne, University of Paris; Associate Professor F. Terrien. Chief of Clinic, Dr. Velter and others. New cases, 14,444; operations, 879 in 1918. 100 beds. Consultations, daily at 9 A. M. Operations: Tuesdays, Thursdays and Saturdays at 9 A. M. Courses in French:

1. Weekly lectures each Friday, 10:30 A. M., by Prof. de Lapersonne. No charge.

2. "Practical course"; Orbito-Ocular Surgery in 10 lessons, with demonstrations on the cadaver, November and March, 50 francs.

3. "Perfectionment"; Review of Ophthalmology in 30 lessons, six weekly; with demonstrations in dark room and laboratory, as well as on the cadaver. November and May, 100 francs.

4. "Vacation"; 15 lessons and demonstrations, September. 50 francs.

No member of the present staff speaks English.

The clinic, wards, operating room and laboratory are large and well adapted for teaching purposes.

Quite a few of our officers here attended the courses Nos. 1, 2 and 3, with benefit.

LARIBOISIERE

Rue Ambroise-Pare. Métro, "'Gare du Nord."

Chiefs of service, Drs. V. Morax and A. Magitot. First assistant, Dr. J. Bollack.

New cases, 14,122; operations, 1,268 in 1918. 60 beds.

Consultations: Mondays, Wednesdays and Fridays at 9 A. M. Operations: Tuesdays, Thursdays and Saturdays at 9 A. M. Courses in French.

1. Weekly lectures each Saturday, 11 A. M., by Dr. Morax. No charge.

2. "Ocular Physiology"; including circulation, tension, iris, visual centers, nerves, etc.; February, 1920. 100 francs.

3. "Ophthalmic Surgery"; Drs. Morax and Magitot. March, 1920. 120 francs.

4. "Refraction"; Date depends on demand. 100 francs.

5. "Perfectionment"; Brief resumé of advances made during the year. Five days following the French Ophthalmological Congress in May, 1920.

6. Laboratory Technic.

7. Ocular Neurology; Dr. Bollack. 100 francs.

Drs. Morax, Magitot and Bollack speak English.

Systematic postgraduate ophthalmic instruction in English and possibly Spanish is being arranged to begin November, 1919. These courses will probably be excellent, extend over three months and be repeated in January and April, 1920. They will be given conjointly by the chiefs of service at the Hospitals Lariboisiere, Enfants Malades, Laennec and possibly others. Details may be had from Dr. Magitot.

The entire service, modern, well arranged, and adequately equipped, is much like our American clinics and has been very popular with visiting officers interested in ophthalmology. We are deeply indebted to Drs. Morax and Magitot, who have shown a great interest in our students and who have given us their time and efforts without stint or reward. They have, indeed, done much toward making our stay of professional value.

QUINZE-VINGT

28 rue Charenton. Métro, "Bastille."

Chiefs of service, Drs. A. Chevallereau, M. Kalt, G. Chaillous, E. Valude. First assistants, Drs. H. Liegard, A. Fourrier and Perossier. Aid of clinic, Dr. J. Lemologlou.

Approximately 18,000 new cases and 2,000 operations in 1918. 100 beds.

Consultations: Daily at 9 A. M. and 2 P. M. Operations: Four days weekly, at 2 P. M.

No courses are given except a weekly French lecture by one of the staff. Dr. Lemologlou speaks English.

The clinic is compact and well arranged. Our officers, who have been most kindly received and shown every possible courtesy here, have shown their appreciation by the frequency of their attendance. The hospice, of which the clinic forms a part, was founded by Louis XII, and serves as a home for 300 blind, with their families.

ENFANTS MALADES

149 rue Sevres. Nord-Sud, "Falguieres."

Chief of service, Dr. A. Poulard; assistants, Drs. Offret and Boussi. Interne, Dr. Merigot de Treigny.

New cases, 6,220; operations, 510 in 1918. 30 beds. Consultations: Daily, at 9 A. M. Operations: Monday, Wednesday and Friday, at 9 A. M. Courses in French.

1. "Practical Course"; for students and physicians, January and June. Monday, Wednesday and Friday.
2. "Complete Course"; to be given in collaboration with Drs. Morax, Magitot, Rochon-Duvigneaud and Dupuy-Dutemps, at Hospitals Lariboisiere, Laennec and Rothschild.
3. "Ocular Surgery"; 100 francs.
4. "Facial Restoration and Ocular Prothesis"; with demonstrations and technic. No charge.

Courses in English; see Lariboisiere. Drs. Poulard and Merigot de Treigny speak English. The clinic is compact, well equipped and organized.

The course on Facial Restoration and Ocular Prothesis with demonstrations of photographs, diagrams and autochromes so kindly given by Dr. Poulard, has been of great value and interest.

NECKER

The Eye Department is in conjunction with the Hospital Enfants Malades.

GRAND PALAIS

10 rue de la Paix.

Chief of service, Dr. Louis Borsch.

The clinic of this military hospital, since closed, was placed at the disposal of the officers; excellent instruction was given under Captain Ayers.

Dr. Borsch has shown many courtesies and kindnesses to our visiting officers. Many will recall that our colleague and countryman lived in Philadelphia for many years.

ROTHSCHILD

86 rue Manin. Métro, "Bolivar."

Chief of clinic, Dr. L. Dupuy-Dutemps. Chiefs of services, Drs. Rochon-Duvigneaud, E. Millee, C. de Speville.

New cases, 38,000 (approximately); operations, 900 in 1918. 100 beds.

Consultations and operations at 9 A. M. and 1 P. M., daily.

Under the provisions of the founder's bequest, only very limited instruction is permitted. This is given in collaboration with the Hospital Lariboisiere and others. Dr. de Speville speaks English.

The hospital occupies the largest, most modern and perhaps the best equipped building used for ophthalmic purposes in Paris. Among the interesting features of the institution are the laboratory work of Dr. Mawas and the many ingenious devices of Dr. Pollack.

LAENNEC

42 rue de Sevres. Métro, "Sevres."

Chief of clinic, Dr. A. Rochon-Duvigneaud. Assistants, Drs. Coutela and Rene Onfray.

New cases, 3,300 (approximately); operations, 150 in 1918.

Consultations daily at 9 A. M. Operations, Wednesdays at 9 A. M.

Instruction given in collaboration with Hospital Lariboisiere.

Dr. Onfray speaks English.

The clinic, tho small, is very well organized. Of great interest is the operative technic and pathologic work of Dr. Rochon-Duvigneaud.

BEAUJON

208 rue Faubourg, Saint-Honoré. Métro, "Alma."

Chief of service, Professor F. Terrien.

SAINT ANTOINE

184 rue du Faubourg, Saint-Antoine. Métro, "Reuilly."

Chief of service, M. Dupuy-Dutemps.

VAL-DE-GRACE

277 rue St. Jacques. Métro, "St. Jacques."

Chief of service, M. Kalt.

The clinic is practically limited to military cases. A most interesting feature of the hospital is the large collection of military pathologic specimens.

BRAZILIAN

389 rue Vaugirard. Nord-Sud, "Convention."

Chief of service, Dr. F. Lemaitre.

An excellent course on facial restoration was given there by Dr. Lemaitre, who has been in the United States.

LANDOLT

Dr. E. Landolt, 8 rue de Berri, Métro, "Alma," generously gave a most interesting series of lectures and demonstrations on Refraction and

Muscular Anomalies. We were greatly endeared to this distinguished ophthalmologist by his keen wit, charming personality and special interest in Americans. Dr. Landolt speaks English.

More detailed information may be readily obtained by writing Drs. Morax, Magitot, Borsch, Poulard, Landolt or Merigot de Treigny, whose addresses have been mentioned with their respective hospitals, and who have kindly volunteered to assist our visitors in any possible way.

It would be indeed ungrateful to close without acknowledging our deep appreciation to the members of the various clinics for their many courtesies; to Captain Boulanger for the assistance derived from his booklet, "Paris Hospitals"; and to the Medical Department of the American Expeditionary Forces for the great opportunities and for the excellent facilities placed at our disposal.

The writer believes that at this time the best fundamental postgraduate ophthalmic training for Americans is to be had in America, but for those who desire a supplementary European education, Paris offers more and greater advantages than any other city of Continental Europe. For those who contemplate definite postgraduate study here, excellent courses to be given in English are being arranged, to commence about January 1, 1920. For those who contemplate visiting European clinics, a few weeks cannot be spent to greater professional advantage than in the several eye clinics of Paris.

TREATMENT OF SYMBLEPHARON AND RESTORATION OF THE ORBITAL SOCKET

WILLIAM H. WILDER, M. D.

CHICAGO.

The method here described is one found valuable by extended experience. This general plan of procedure, using different substances to preserve the full extent of the socket has come into prominence in the treatment of war injuries. Presented before the Section on Ophthalmology, American Medical Association, June, 1919.

Symblepharon may present such a variety of degrees that the correction of the difficulty will require varying degrees of ingenuity and technic on the part of the ophthalmic surgeon. Strictly speaking, the term "symblepharon" is reserved for those cases in which the eyelid has become adherent to the eyeball.

The degree of the adhesion varies from the simplest form in which the edge of the eyelid, or part of it, is attached to the eyeball, and to this the term "anterior symblepharon" is given. In the more extensive form in which the culdesac or fornix of the conjunctiva is involved we have so-called "posterior symblepharon." When the whole surface of the eyelid is attached to the globe and the fornix is obliterated, we use the term "total symblepharon," and this may affect both lids after extensive burns or injuries, all of the conjunctiva being destroyed.

In severer degrees of this kind, the edges of the lids also may have been destroyed so that they will have grown together, giving the condition of ankylosymblepharon. In these severer forms, especially if caused by extensive injury or burns of the conjunctiva, the eyeball has in most cases been removed; but in some the atrophied, shrunken bulb may be present; and the surgeon should consider this in his treatment.

The causes of this condition are usually traumatic, as from burns of the conjunctiva with acids, strong alkalis, molten metal, lime, gas flames, or other strongly irritating substances that occasion ulceration of the conjunctiva.

Certain diseases, such as pemphigus, diphtheria, and even long continued trachoma, may cause such destruction and contraction of the conjunctiva that the culdesacs will be obliterated and a condition produced as bad as that made by a severe burn.

Although, strictly speaking, as has been said, symblepharon means the adhesion of the eyelid or eyelids to the eyeball, the same term may properly be applied to the adhesion of the lids to the tissues of the orbit after the removal of the eyeball, for in such cases the conjunctival sac is obliterated and prevents the use of an artificial eye. Milder degrees of this condition result from destruction of too much conjunctiva in careless enucleations. Continuous wearing of ill fitting glass eyes that irritate the conjunctiva may cause bands of scar tissue that will seriously contract the culdesacs.

More severe forms follow destruction of the eyeball and the orbital tissues from deep burns or injury of this region by explosion or shell wounds. In the healing of such wounds, large, firm masses of scar tissue are formed which bind the lids firmly to the deeper structures. These cases of total symblepharon are the kind that were regarded as incurable by the older ophthalmic surgeons. Arlt had no operation for them. Knapp had seen no more than temporary improvement in the treatment of them, and regarded the condition as hopeless. Fuchs[1] says: "Cases of extensive symblepharon posterius, and obviously also cases of symblepharon totale, are incurable. The same is true of symblepharon induced by the gradual shrinking of the conjunctiva."

The problem in the treatment of these cases is the same, altho modified by the degree of the condition, and that problem concerns the restoration of the conjunctival culdesac or one that simulates it. If the eyeball is present, the culdesac is to be restored to allow mobility and prevent the irritation of the eye by the dragging on the adhesions. If the eyeball is absent, the culdesacs are to be restored to furnish a socket for the comfortable wearing of a prosthesis.

EARLY TREATMENT FOLLOWING BURNS OF THE CONJUNCTIVA TO PREVENT SYMBLEPHARON

When the eye is burned severely by chemicals, by gas flames or by molten metal splashing into it, the part of the conjunctiva affected is usually destroyed at once and in a few days sloughs off. Such a burn corresponds to a second degree burn of the skin, and the amount of damage done to the parts beneath the conjunctiva will naturally depend on the degree of the heat that strikes the part, and the length of time it acts. Usually a very small quantity of fluid chemical substance gets into the conjunctival sac, and this may be more or less neutralized by the copious supply of tears that is thrown out.

With burns from gas flames, the prompt closure of the lids protects the conjunctiva to a certain extent, and the greater part of the injury is done to the outer surface of the lids, altho the cornea and ocular conjunctiva may suffer. When molten metal gets into the eye, altho the quantity may be small, the spasm of the lids may hold it firmly in the conjunctival sac, where it continues to burn the tissues with which it is in contact until its heat is lost. As a result, the destruction may be deep.

In any such case in which the conjunctiva is destroyed in whole or in part, the eschar must be cast off before healing can begin. Granulation tissue develops to replace the lost substance, and from this fibrous or cicatricial tissue forms. Two granulating apposed surfaces will certainly grow together in spite of frequent attempts to separate them unless epithelium forms over the surface to prevent it. But it is just in such cases as these, in which the tissues have been injured by heat or the corrosive action of chemicals, that the regenerative power of the epithelium seems to be impaired.

It is at this stage that the surgeon can come to the help of nature and by aiding in the epithelization of the wound prevent much of the cicatrization that will inevitably produce great deformity if not checked. As soon as it is evident that the wounded surface is clean and granulation is well under way, attempts should be made to cover the raw surfaces with epithelium, for the sooner this is accomplished the sooner will the formation of cicatricial tissue be checked. The general surgeon, recognizing this principle, covers denuded areas that cannot be accurately apposed as soon as possible with thin layers of epidermis. This can be done at the time of operation if cutaneous tissues have been sacrificed, but in case of loss of tissue from burns or corrosives, he must wait until it is evident that repair is beginning after the shock to the tissues.

In the case of the injured conjunctiva, the difficulty of accurately implanting thin grafts of epidermis or mucous membrane is greater than would be encountered on most surfaces of the body. Again, if the eyeball remains, and is not too badly injured to require removal, the integrity of the cornea must be carefully considered in any reparative means to be employed.

These difficulties can be overcome by the use of suitably prepared plates conforming to the shape of the eyeball and to the conjunctival sac to hold the layers of epithelium smoothly in contact with the raw surfaces. The device employed must be such that it will not injure the cornea.

A glass plate or porcelain shell with a curvature like that of the eyeball, as recommended by Morton[2] and May[3] has been succesfully employed. Hotz[4] employed a thin lead plate for the purpose of holding the graft in place. H. W. Woodruff[5] used a sheet of block tin cut to the required size and molded to the proper curvature. But whatever material is used for the support, it is well to have a circular opening in the plate at least the size of the cornea; and to insure the least possible irritation of the cornea, the plate should be coated with a layer of hard paraffin of a melting point of 130 or higher, if it can be obtained. I[6] first described this device in a paper presented to this section in 1906 (Fig. 1).

My preference is for a plate made of a sheet of block tin about 1 mm. thick, which can be easily sterilized and fashioned with knife, scissors and file to the required shape and size, so that it will fit into the culdesac above and below. The paraffin to cover it should be hard so that it will not soften down too much by the heat of the body and be thrown into ridges or hummocks by the movement of the lids. Repeated boiling of such paraffin will raise the melting point and make it harder.

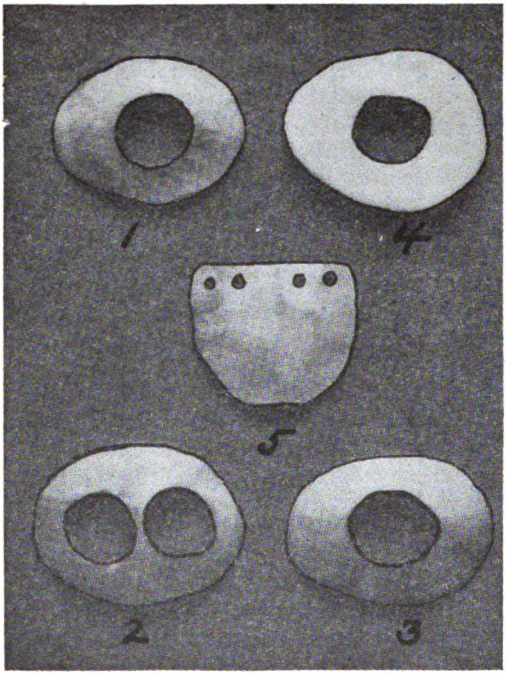
To coat the plate, after it has been made the proper shape and size and sterilized, it is held by its edge with light forceps and dipped quickly into the melted paraffin contained in a wide mouthed vessel like a graduate glass. This vessel with the melted paraffin should be in a dish of hot water to prevent congelation or thickening, otherwise the layer of paraffin deposited on the plate will be uneven. The thin layer that adheres to the metal can be quickly set by dipping it into cold water, and it can be repeatedly dipped into the paraffin and into the water until it has an even coating of the proper thickness.

Such a smooth paraffin-coated plate offers little irritation to the eyeball, even if the cornea is intact, and can be safely employed to keep the raw surfaces of the eyelids separated from those of the eyeball during the healing following a burn of the conjunctiva.

But this alone is not sufficient. As soon as the eschar has been cast off and granulation has begun, attempts should be made to restore epithelium to the injured area, and this can be done in the form of mucous membrane or of thin grafts of epidermis which are held in place by the plate. Naturally, mucous grafts are preferable for this situation, and if the area to be covered is not too large, suitable ones can be cut with the section razor from the inside of the lips, or from the inner surface of the labia or vagina in women.

Hotz[7] was one of the first to advocate that thin Thiersch grafts from the less hairy parts of the skin are suitable for replacing the conjunctival culdesac in symblepharon. C. H. May[8] reported the successful use of Thiersch grafts, held in place by thin porcelain plates, in an operation for total symblepharon performed in 1897.

When mucous grafts are not available, and usually they are not, Thiersch grafts may be employed. In cases such as those we are considering, these grafts should be cut very thin from the inside of the arm with a flat back razor such as is used for section cutting. The thin strip of epidermis, which should be larger than the area to be covered, should be transferred directly from the razor to the paraffin plate, over the edge of which it is folded with a spatula or with the gloved fingers, the raw surface being outward. It adheres well to the paraffin surface and can be smoothed out so that no wrinkles are present, and its position on the plate can be shifted as desired.



In the illustration, 1 and 3 represent block tin plates prepared for the symblepharon operation, the cornea being present; 2, a plate used for restoring culdesac for prosthesis; this would be coated with paraffin; 4, a similar plate coated with paraffin; 5, plate to be sewed to the lid in the method of Hotz and Woodruff.

During this gentle manipulation of the graft, an assistant should keep it moist by dropping warm saline solution on it. The plate should then be carefully inserted into the culdesac, an assistant helping with retractors, the graft-covered edge being the first introduced. If the two culdesacs are treated at the same time, the lower graft can be held more firmly to the plate by a couple of fine sutures passed thru its edges at suitable points and the hole in the plate. This prevents it being wiped off or displaced when it is inserted.

If the plate has been properly constructed and the operation carefully performed, the raw surface of the graft will be perfectly coapted to the raw surface of the lid and the culdesac, and should adhere firmly. If the cornea is denuded at any point, it would be well to defer the application of the graft until epithelium has formed over the denuded cornea, or to limit the graft to the raw surface of the deeper part of the culdesac. An attempt could be made at a later treatment to cover the raw surface of the lid that is likely to come into contact with the cornea, with a mucous graft applied on the plate in the same manner. The culdesac should receive the first attention.

Early attempts at covering the raw surfaces with epithelium in this manner, as soon as it is evident that the tissues are undergoing healthy repair, will do much to prevent serious symblepharon that later would require more extensive operation.

Once symblepharon has occurred, the method of treatment will depend on the degree of the condition. In simpler cases in which the eyelid is attached to the eyeball at one point, the operation of Arlt may be sufficient, or a more extensive adhesion may require the covering of the defect on the eyeball with flaps of conjunctiva, which may be done after the well known methods of Teale or Knapp.

But if the loss of conjunctiva is too great to allow covering with conjunctival flaps, recourse must be had to grafts of mucous membrane or epidermis, and these must be held in place by some kind of conforming plate.

In preparing the culdesac for the graft by dissecting the lid from the eyeball, it is important that the incision should follow close to the tarsus, if that is left, so that the lid will not be too thick. Scar tissue on the eyeball or lid or fornix should be trimmed off if possible, and it is well to err on the side of making the culdesac too deep rather than too shallow. The graft that is used should be in one piece and somewhat larger than the area to be covered. No sutures are necessary, for the plate should hold it well in place. It adheres only to the raw surface; the overlapping edges are either cast off or can be trimmed away later at one of the dressings.

RESTORATION OF THE ORBITAL SOCKET FOR PROSTHESIS

Here again the problem is that of lining with epithelium the culdesac that is made after dissecting the lids free from the orbital tissue, which is usually badly scarred. Uhthoff[8] says that in 600 eye cases seen by him during the war, 11 percent were wounds of the orbit, and that in numbers of cases of plastic operation on the lids and conjunctiva he was able to make possible the wearing of a prosthesis. He emphasizes the importance of prompt and accurate sutures of wounds to prevent the formation of cicatricial tissue.

Poulard and Réal[9] describe a means of holding a gutta percha plate firmly in the upper culdesac so as to prevent bands of cicatricial tissue from obliterating it. The plate is fashioned from a model of a wax impression of the orbit and then is mounted on the small arm of an apparatus fastened around the head. The arm holding the plate is adjustable so that when the apparatus is in position, pressure will be made on the part of the orbit desired to hold the prosthesis.

Morax,[10] commenting on the difficulty of obtaining a new cavity for prosthesis in total symblepharon, offers a new operation. The lids are cut loose from the underlying tissue to which they are attached, in such a manner that they form large flaps, which are everted and stitched to the skin above and below. The exposed raw surfaces are then covered with wide epidermal grafts. At the end of three weeks the flaps are released and sutured together over a plate of enamel or lead. This remains for six weeks or longer, and then the lids are separated and the socket is ready for the prosthesis.

Various methods have been devised and practiced for forming the new culdesac of pedunculated flaps or skin from the parts adjacent to the orbit. Maxwell[11] uses a bridge flap from the cheek to restore the lower culdesac. Schwenk and Posey[12] use a pedicled flap from above the brow to line the upper culdesac, and combine this with a Maxwell operation for the lower culdesac. Danis[13] describes an ingenious operation in which he uses a temporofrontal pedicled flap for restoration of the lower culdesac.

In all such operations a conforming plate must be used to hold the flap well in position, and it is best to have one or more small openings in it to allow for drainage and cleansing. The most important part of the problem is to prevent the subsequent contraction of the culdesac. To approach a solution of this it is necessary, first, to make the dissection deep enough. It should extend to the margin of the orbit, so that the periosteum may be seen. Secondly, it is necessary to dissect away all scar tissue that will tend to cause retraction of the culdesac. In order to accomplish this it is best to make a free division of the external canthus, and with this help a larger plate can be inserted. For such cases there is an advantage in having the graft firmer than the thin Thiersch grafts used for simple cases. The grafts can be cut so as to include more of the corium, and, if desired, when the plate is in position, one or more loop sutures, armed with two needles may be passed thru the graft at the bottom of the culdesac and made to pass thru the periosteum before emerging on the cheek, where they are tied over a roll of gauze. This is the value of the operation of Weeks, who restores the culdesacs with Wolff grafts which are secured in place by sutures which anchor it to the periosteum and emerge on the cheek.

The paraffin plate alone cut to the proper size is usually sufficient and forces the graft evenly into every part of the pocket. The canthus should be restored with sutures and a moist dressing applied. The plate is not removed for several days, at which time the grafts will be rather firmly adherent.

The socket can be irrigated thru the opening in the plate. Care should be taken in removing it that the graft is not torn away, but it usually slides out easily. If there is difficulty in reinserting it, it may be trimmed slightly, or it may be cut in two along the horizontal middle line and hinged by boring small holes at proper points and uniting the two halves with firm silk or small wire. Each half is then coated with hard paraffin as before, and it can be reinserted.

Some form of plate, and as large a one as possible, should be worn for several weeks to hold the shape of the new culdesac. The paraffin plate irritates the new socket as little as anything I have used. For such restored sockets, artificial eyes should be especially made, the ordinary ones making irregular pressure and tending to cause the development of scar tissue.

BIBLIOGRAPHY

1. Fuchs' Textbook of Ophthalmology, 5th Edition.
2. Morton. Ophthalmic Record, August, 1898.
3. May. Arch. of Ophth. v. 28, p. 182, 1899; and Arch. of Ophth. v. 30, p. 471, 1901.
4. Hotz. Ophth. Record, November, 1899.
5. Woodruff, H. W. Annals of Ophth., March, 1903.
6. Wilder. Jour. Amer. Med. Assn. v. 47, p. 571, 1906.
7. Hotz. Annals of Ophth., April, 1893.
8. Uhthoff. Berl. klin. Woch. 1916, No. 1. Abst. Clin. Opht. 1917, p. 233.
9. Poulard and Real. Ann. d'Ocul. v. 155, p. 41, 1918.
10. Morax. Ann. d'Ocul v. 154, p. 494, 1917.
11. Maxwell. Ophthal. Rev. v. 22, p. 121, 1901.
12. Schwenk and Posey. Trans. Amer. Ophth. Soc. v. 16, p. 178, 1918.
13. Danis. Ann. d'Ocul. Feb. 1916.

VISUAL DISABILITY FROM EYE INJURY AND COMPENSATION

SAMUEL G. HIGGINS, M. D.

MILWAUKEE, WIS.

This report prepared for the Milwaukee Oto-Ophthalmic Society on visual disability from eye injury and compensation to be allowed by the Wisconsin Industrial Commission, was read before the Chicago Ophthalmological Society, May, 1919.

The need for a table or working plan for the adjustment of compensation to employees for eye injuries was brought to the attention of the Milwaukee Oto-Ophthalmic Society by a set of direct questions submitted by the Industrial Commission of Wisconsin. The commission stated that they desired to govern their decision by our replies.

The questions asked us were these:

First. Is a table recording vision by reading the Snellen test type letters practical?

Second. Is there a compensation disability accruing to the man whose vision has been impaired by accident, but with the use of a clear lens may be brought to normal?

Third. What is the compensation disability of an employee whose injury has caused a dilation of the pupil and who is required to constantly wear a colored lens?

Fourth. What is the compensation disability accruing to the employee where the injury has caused a cataract and the loss, in addition to loss of vision, includes loss of power of accommodation?

Fifth. What is the compensation disability in case of double vision?

Other questions arising in the day's work of the commission were mentioned. One requiring the judgment of an ophthalmologic jury or court is that concerning the compensation disability accruing to that employee who sustains a traumatic cataract and who refuses operation for removal of the cataract.

The essence of the whole discussion is to establish an equitable settlement by the Commission, according to the enacted law for compensation for eye injury. To do this a mutual understanding of the position of the commission and of the logic of the physicians is essential. The commission informed us that the special legislative committee of 1909 recommended a Workmen's Compensation Act which was passed in Wisconsin in 1911, amended in 1913, 1915 and 1917 and that further amendments are before the legislature now in session. Oculists, as citizens, may suggest amendments, or aid in legislative passage. At present the report requested of the physician or oculist is regarding the disability; and the business of the commission is the awarding of the compensation which may be legally and justly allowed for such disability. In other words, we may state our opinion as to the injury in terms of disability or loss of vision and the commission may state its opinion in terms of compensation or money allowed therefor.

There is written into the law of Wisconsin to date a schedule of fixed benefits, stating that the compensation to be paid shall be 65 per cent of the average weekly earnings of the employees for the period named in the schedule, to-wit:

The loss of an eye by enucleation, 160 weeks.

The loss of the second eye by enucleation, 320 weeks.

Total blindness of one eye, 140 weeks.

Total blindness of the second eye, 280 weeks.

It may be of passing interest to know that the award for total deafness of both ears is 160 weeks; total deafness of one ear, 40 weeks; total deafness of the second ear, 120 weeks. Also that the award for the loss of one arm at or near the shoulder is 240 weeks; and the loss of a hand is 160 weeks, and that the loss of a foot at the ankle approximates the award for the loss of an eye, being 120 weeks.

The figures are mentioned in view of the testimony of physicians whose sworn opinion held that a man, whose vision was reduced by injury to 20/40, should receive one-half of the 140 weeks' pay, the 140 weeks representing compensation for the total loss of vision in one eye. It may be the honest opinion of the physician that a man should receive 70 weeks' pay for the risk, pain and suffering and 20/40 vision due to an eye injury, but risk, pain, suffering, etc. are not written in the law and are not compensated for.

There are other legal limitations to our discussions in Wisconsin, viz: that at present the law does not mention the nature, kind, nor character of the occupation of the injured employee, nor compensating him with that in mind. Neither is there a provision requiring information concerning the vision in either eye of the employee before the injury was sustained. The physicians in Wisconsin have the pleasure of acknowledging that the interpretation of the disabilities, due to eye injury, and the amount of compensation allowed by the commission, always attempted to be fair and liberal.

Having learned the position of the commission the Society wished to inform the commission of their rights and stand. In the first place the Society was unanimous in stating that the vision which is recorded 20/40 on reading a certain line of Snellen type, does not represent vision which is ½ of total blindness. They further thought that a table could be agreed upon by the oculists in this Society and other Ophthalmological Societies which would be interpreted in terms of amount or portion of loss of vision. However, due to the intricate factors associated in the visual act and disturbances of these by an injury, the process of employing and enjoying vision is subject to more variances and interpretation than can be expressed in any one table. Therefore, the visual disability must be submitted to the commission by the testimony of one or more oculists in each given case. That further the commission could not in all cases accept the recording by the Snellen method of loss of vision in one eye, to be the full equivalent of visual disability without an opinion or explanation of visual disability by an oculist.

The table approved by the Milwaukee Oto-Ophthalmic Society is similar to the state law in one respect and that is that it may be amended. We are anxious to meet with and accept your table or suggestions where we can simplify our answers to the commission and further submit a scheme or plan which may be understood by all parties concerned. By reference to the recent reports it is found that we all agree that what we record as 20/40 vision does not represent one-half either of normal vision or total blindness. In the Milwaukee table 20/40 vision represents 94% of vision or a 6% loss of vision.

Dr. Prince and others, in Springfield, agree on a basis of settlement of 100 weeks for total loss of vision—that for partial loss of vision of 20/40, five weeks should be awarded. That is practically 5/100 of 100 weeks or 5% of the award for total loss of vision.

Dr. Chapman's table presented to the American Academy of Ophthalmology and Oto-Laryngology, in Pittsburg in 1917, allows that 20/40 is 90% of vision or a loss of 10%.

Dr. Frank Allport suggested in conversation that if an accident insurance policy allowed $2,000 for blindness, an injured man with 20/40 vision should receive an award of $400.00. That would be 400/2000 of the amount for blindness or 20/100, or may I say this is 20% of the total award.

If compensation measures disability, we have an expression of 20/40 vision in these various tables of 3%, 5%, 10% and 20% of the amount to be awarded for total blindness. The Milwaukee Oto-Ophthalmic Society have in mind adding two large letters to the Snellen chart, one to read 20/310, said to be equal to 84% loss of vision, and one 20/350, said to be 100% loss of vision, or industrial blindness.

Perhaps the report of the Committee of the Chicago Ophthalmological Society recommending 5/100 as industrial blindness would be more practical. I am told that the army standard is 5/200 which may be even more easy of application and a fairer measure. Dr. Prince puts down nil for total blindness, and awards 75 weeks for 10/200 vision. Dr. Allport would allow $1,200 for 20/200 vision when the award for total blindness is $2,000. May I not assume that we are willing to set some sort of light perception or reading of visual acuity as Industrial Blindness?

To refer to first principles again, I may say that it seems to me that an Industrial Commission or jury or legal court are inclined to accept a visual acuity record as an expression of visual disability.

With this in mind we proceeded with direct answers to the question submitted to us. We also recalled the arguments with the optometrists regarding the prescribing of glasses in which we held that to be a medical act. We believe that defective vision due to trauma should be restored by lenses to be prescribed. Therefore, the vision is taken without and with glasses. The better vision of the two is that recorded.

Question number two raised by the Commission is: What compensation disability, if any, is accruing to the man whose vision has been impaired by accident, but with the use of a clear lens may be brought to normal? The answer is that he is entitled to a disability amounting to one-half of the difference between his vision without correction, and with correction, plus any defect remaining after corrective glasses are given.

To illustrate, a man with vision after accident without glasses is 20/200, with glasses 20/40. The disability of 20/200 vision we scaled at 54% loss, disability at 20/40, at 6% loss, his disability then would be one-half of the difference between 54 and 6 which is 24. His award would be based upon 24% loss of vision. Should his vision be 20/200 without glasses and 20/20 with glasses the total disability would be one-half of that awarded for 54% loss of vision. This is an unlikely case but for the wearing of a high astigmatic lens we considered he still is 24% disabled.

Question number 3, refers to a permanently dilated pupil requiring the wearing of tinted or colored lenses. After some discussion this was agreed to be 5% disability. This would be added to other disability present.

Question number 4, refers to compensation disability accruing to the employee where the injury has caused a cataract; and the loss, in addition to vision, includes loss of power of accommodation. The Society held that the question should have also stated that the loss included both the loss of power of accommodation and the loss of binocular vision. An arbitrary figure of disability was held to be 50% with the additional disability represented by vision obtained with glasses. If the vision is brought up to 20/40 he should have the 6% disability award, plus the 50% disability for the cataract.

The reason for this may be presented to the commission in explanation of what the man has lost, and what he has left. First, if he does not use the lens for this eye, he has lost a large portion of his useful vision. Having lost the power of accommodation because of the removal of the lens, he has also lost the power of binocular vision.

He retains to a large degree his field of vision on the side of the operated eye which is of much value in avoiding accidents, collisions, etc. He retains what Fuchs' calls "A reserve for the future" which is of much value should the originally uninjured eye be destroyed.

The fifth question asked of us was with regard to double vision. The committee of our Society submitted an interesting and expressive report. The report to the commission is as follows:

"The fact of double vision does not warrant granting the total loss of an eye, as there is not loss of an eye but the loss of binocular single vision, which in most cases can be restored either by operation or the wearing of prisms. In many cases the injured very soon learned to ignore the double vision. The question then to decide is, What is the relative loss between binocular single vision and single ocular vision? They have the use of both eyes, but only one eye at a time. Therefore, aside from the annoyance, nuisance and poor cosmetic appearance of a blinder being alternately used over the eyes, what would be the interference with their earning capacity?

"Many persons, as for instance jewelers, stenographers, machinists and other industrial trades requiring very accurate vision, would certainly have greater disturbance in performing their work with one eye than would unskilled labor, or most agents of corporations, or officers of banks, life insurance companies, etc. Therefore, it seems as tho our state law should be changed so that the commission can take into consideration the interference of earning capacity in a particular employment. Under existing conditions we believe no percentage table applicable or just, but as the percentage of disability is the information desired, we recommend 25% disability for total loss of vision in one eye in the uncorrectable cases. In cases that are corrected, 12½%."

The Society as a whole cut these percentage figures to 20 and 10.

With regard to the additional question as to disability in case of traumatic cataract when the man refuses operation, the Society did not express a united opinion and will be pleased to know how this question is handled by the Chicago Ophthalmological Society.

In conclusion the Milwaukee table is based upon a 3% loss of vision for every 10 foot loss of ability to read the letters of the Snellen chart up to 20/350 which we allow to be industrial blindness. We do not follow the report of the Committee of the Chicago Ophthalmological Society which appeared in the *Ophthalmic Record* of January, 1917, as we feared the report on the whole would not be understood by the Wisconsin Industrial Commission.

The vision of both eyes does mean much in the estimation of visual disability. But if no regard is made of the vision of either eye before injury settlement can hardly be based upon this after injury. It is difficult enough when estimation deals with the one injured eye alone. No complaint has impressed the commission as to loss of stereoscopic vision. This faculty is restored upon effort. Moreover, some of us are not so sure that stereoscopic vision is entirely dependent upon two equally good seeing eyes.

Human interest, plus the statement of the man and testimony of oculists, tends to give more compensation rather than less for disfiguring injury with bad cosmetic effect. We believe compensation should vary with character of employment. This is not yet written in the Wisconsin law. This does not limit our report as to visual disability. Simplicity in the table should be our watchword.

20/ 20=100% vision and no loss of vision
20/ 30= 97% vision and 3% loss of vision
20/ 40= 94% vision and 6% loss of vision
20/ 50= 91% vision and 9% loss of vision
20/ 60= 88% vision and 12% loss of vision
20/ 70= 85% vision and 15% loss of vision
20/ 80= 82% vision and 18% loss of vision
20/ 90= 79% vision and 21% loss of vision
20/100= 76% vision and 24% loss of vision
20/110= 73% vision and 27% loss of vision
20/120= 70% vision and 30% loss of vision
20/140= 64% vision and 36% loss of vision
20/130= 67% vision and 33% loss of vision
20/150= 61% vision and 39% loss of vision
20/160= 58% vision and 42% loss of vision
20/170= 55% vision and 45% loss of vision
20/180= 52% vision and 48% loss of vision
20/190= 49% vision and 51% loss of vision
20/200= 46% vision and 54% loss of vision
20/210= 43% vision and 57% loss of vision
20/220= 40% vision and 60% loss of vision
20/230= 37% vision and 63% loss of vision
20/240= 34% vision and 66% loss of vision
20/250= 31% vision and 69% loss of vision
20/260= 28% vision and 72% loss of vision
20/270= 25% vision and 75% loss of vision
20/280= 22% vision and 78% loss of vision
20/300= 19% vision and 81% loss of vision
20/310= 16% vision and 84% loss of vision
20/320= 10% vision and 90% loss of vision
20/330= 7% vision and 93% loss of vision
20/340= 4% vision and 96% loss of vision
20/350= 1% vision and 99% loss of vision

NOTES, CASES AND INSTRUMENTS

RETINAL EMBOLISM

Clarence A. Veasey, M. D.

SPOKANE, WASHINGTON

Embolism of the superior branch of the central retinal artery, the lower half of the visual field remaining permanently abolished.—O. R., a married female, aged about thirty years, consulted me September 8th, 1909. She stated that four days before she had discovered upon waking in the morning that the vision of the left eye was abolished. Vision of R. equaled 5/5 and the patient read easily Jaeger 1. Vision of L. equalled 5/22, the patient being unable to read any Jaeger type. The pupils of both eyes responded to all tests. The media were perfectly clear, but the disc of R. was exceedingly pale in the upper half on the nasal side and the upper two-thirds on the temporal side. There was marked loss of translucency in the disc, the physiologic cup being apparently covered with a thin more or less opaque veil-like substance at about the level of the disc itself. All of the arterial branches arising from the superior branch of the central retinal artery were found dwindled to mere threads, there being no discernible blood current in them. The veins also appeared to be not more than one-third their normal size and the upper half of the retina supplied by these vessels was at that time exceedingly opaque. There were no hemorrhages, and no cherry red spot in the macula was observed. The inferior branch of the central retinal artery and all its branches were quite normal. The lower half of the visual field was entirely abolished, the fixation point itself remaining in the preserved portion.

Deep massage, the employment of nitroglycerin and the iodides caused the restoration of normal vision in five days' time. The retinal edema, however, did not begin to disappear until some days later. There were no lines along the blood vessels indicative of perivasculitis. There was a small artery coming from the physiologic cup and passing out to the macular region just as the superior branches and which evidently came off from the superior. No coarse macular changes took place.

Examination of the urine was negative, but there was a marked systolic heart murmur, more noticeable in the neighborhood of the apex. For more than one year prior to this attack the patient had observed periods of obscuration of vision and what she called "black spots" (probably arterial spasm), these attacks lasting only a few minutes at a time. Two months later the patient's visual acuity was 5/5 in each eye and the patient could read Jaeger 1. The lower half of the visual field remained entirely abolished.

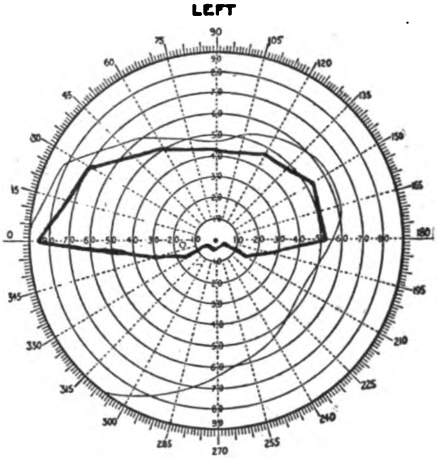


Fig. 1.

HIGH MYOPIC ASTIGMATISM

Clara A. March, M. D.

BUFFALO, N. Y.

The following case seems to be worthy of mention because of the unusually high degree of compound myopic astigmatism. The patient, Miss M. A., a nurse, came to my office August 9, 1919, having been referred to me by Dr. Bennett. She complained of headache in the frontal region, usually in the morning. The headaches had been continuous for the last three weeks. They were frequently accompanied by nausea and vomiting. Vision: R. 3/200, L. 5/200. Under cycloplegia with homatropin the skiascopy was R. —27 ⊃ —13; L. —27 ⊃ —12. The media were clear and the fundi were normal.

The right —13. sph. ⊃ —14. cyl. axis 7½° V. = 20/50.

Left —12 sph. ⊃ —15. cyl. axis 157½° V. = 20/40.

August 14, the patient returned and I prescribed:

Right —12 sph. ⊃ —12. cyl. axis 15° V. = 20/50.

Left —12 sph. ⊃ —14. cyl. axis 165° V. = 20/40.

With plus 3. added for near work, the patient read No. 5 Jaeger at 13 inches. She said she never saw so well before.

CONGENITAL APHAKIA

P. B. Wing, M.D., F. A. C. S.

SAN DIEGO, CALIFORNIA

In 1915, while practicing in Tacoma, Washington, I was asked by one of the obstetricians to examine the eyes of a new-born girl baby at one of the local hospitals.

I found every appearance of complete double congenital cataract, the pupils were uniformly gray; otherwise the eyes were apparently normal. Contrary to the usual history of such cases the child was well nourished, strong, of good size and showing no signs of poor development, low vitality and low mentality that I have so often seen in such cases.

When the child was about six months old I was requested to operate. The patient was prepared for the operation by my assistant, Dr. J. H. Spencer, the pupil was dilated and a general anesthetic given and I proceeded to open what I supposed to be the anterior capsule; much to my surprise I found only a thin membrane.

The knife needle was inserted in the usual manner to do the ordinary first needling and when withdrawn a small black opening remained. There was no reaction and a few days later I operated on the other eye, this time, however, I dilated the pupil as before and with the knife needle split the capsule with a large inverted V-shaped incision; there was no lens matter, nothing but the capsule like membrane.

In a few days the same operation was done on the first eye. Large black pupils at once resulted. No reaction from the operation, no flakes of lens matter appeared in the pupil or in the anterior chamber.

The child is now four years of age, a well-developed, intelligent baby girl, pupils are round and clear, fundus normal, and with a plus 7 D. lens she quickly picks up a pin from the floor and sees objects like a nickle, a pencil, or penknife at a distance of twenty feet. There is a slight convergence which may have to be corrected later by an operation. I have been unable to find a similar case reported; most authors do not mention it, one or two state that such cases are on record, but doubt the authenticity of them.

I beg to be excused for not making a more accurate diagnosis, but as I did not dilate the pupil or give an anesthetic until the time of operation, and as my assistant prepared the patient, I did not examine as carefully as I might have done. The anterior chamber appeared normal in depth and the iris was not tremulous. I am of the opinion, however, all things considered, that my diagnosis would have been the same until the operation cleared it up.

I am certain that the lens was not absorbed after birth as there was no injury during labor, which was normal and easy, also there was no reason to think that absorption took place in utero. It simply was absent.

SOCIETY PROCEEDINGS

NETHERLANDS OPHTHALMOLOGICAL SOCIETY.

FIFTY-FOURTH MEETING, DECEMBER 15, 1918.

DR. C. NICOLAI in the Chair.

Treatment of Corneal Ulcer with Optochin.

H. F. DUBOIS mentioned it is about 5 years since optochin was introduced for hypopyon ulcer. He has been unable to examine all his cases microscopically. His survey includes cases with and without dacryocystitis and can be divided into true serpent ulcer, hypopyon ulcer not serpiginous, abscess of cornea and hypopyon keratitis.

During the last 10 years, he has been able to treat, until discharge, 85 cases, chiefly among a rural population; 54 men and 31 women; 54 of the 85 were between their 50th and 70th years. The youngest was 7, the oldest 90 years. In 37 the cause was a trauma. In 48 (56%) blennorrhea of the lacrimal sac was present; 51 were typical serpent ulcer, of which 36 had a dacryocystitis; nonserpiginous, 29, of which 12 had dacryocystitis. Two cases were of corneal abscess and 3 were hypopyon keratitis in the form of keratomycosis; 60 cases were taken into the hospital.

All factors taken together, the conclusion is that hypopyon ulcer does not heal better than without optochin. The results are the same as before the optochin treatment. The first impression that hospital treatment would be less necessary, has proven wrong. Galvanocautery and paracentesis, with optochin treatment are less necessary. It shows a better action in the cases with dacryocystitis, than in the cases without affection of the lacrimal sac. Instituted early, optochin treatment is not able to stop further extension of the ulcer.

In the beginning optochin was used in a 1% salve, 3 to 6 daily applications in the conjunctival sac, later as drops in a 2% solution every two hours. Dubois learned that one cannot be too careful in the appreciation of a new therapeutic measure, and should not take the general impression of each separate case, but must compare two equal unselected series of cases, in one of which the measure is used, in the other not.

DISCUSSION. Van der Hoeve was sorry that no bacteriologic examination had been made, as the value of these otherwise important statistics rises or falls with the more or less frequent presence of the pneumococci and other organisms. He asked an explanation for the great number of cases in which Breda mentions the very changing course of the disease and the changing effect of the optochin treatment. He uses optochin in every cataract operation before extraction, pneumococci being present or absent.

Snellen considered that the favorable effect in the cases with dacryocystitis, demonstrates a favorable influence on the pneumococci; he spoke of the many cases of hypopyon ulcer where pneumococci are absent. He saw especially a favorable influence in beginning cases. He could not say much of the anesthesia and considers that mydriatics have a less favorable influence.

Van Romunde stated that the simultaneous use of optochin and atropin produces an undesirable chemical reaction, which makes the success of the application illusory.

Tresling had good results with pure pneumococcic ulcers, no results with more serious cases, and pointed out the necessity of having fresh solutions. He is in favor of its preventive use in case of operations.

Weve spoke about the quick poisoning of the pneumococci and the value of touching the ulcer with a strong concentration and after that instillations of weaker solutions. Wessely's treatment of these cases should be mentioned.

Nicolai is still satisfied with zinc salicylat, with which he touches the ulcer and which he uses as drops, and without bandage. He does not see any benefit in the preventive use.

Van Der Hoeve would not give up the preventive application and mentioned the different local malignancy of the serpent ulcer. Dubois, answering thought that even with the absence of bacteriologic examination a curative action should have appeared.

Von Hippel's Disease: Retinal Angiomatosis.

A. W. Mulock Houwer showed a girl, 23 years old, who had received a blow on R. 10 years ago. The eye became blind. In July, 1918, she consulted an oculist as L. saw badly for the last 4 months. Vision was then 1/60 with a much contracted field. The marked indolence of the patient was remarkable. R. was now quiet with shallow anterior chamber, atrophic iris, occluded pupil, normal tension, and absence of light perception.

The anterior part of L. remained normal, some fine and larger opacities were in the vitreous, especially in the upper part. In the retina were two groups of red knobs: one up and peripheral, one temporal and pheripheral. Strongly dilated vessels, which cannot be distinguished as veins, going toward these knobs. Surrounding the knobs was massive white tissue. Also larger and smaller white spots were seen in the retina, and many clear glistening white points, especially in the region of the yellow spot. At the lower part of the retina was a transparent flat detachment, thru which many glittering spots in the subretinal cavity could be seen. No other changes.

Altho she complained much of headache, neurologically nothing could be found. Careful Roentgen treatment had no success. A very large retinal detachment in the lower half was present, which covered the optic nerve and the lower half of the temporal knobs. Vision had diminished to light perception. Houwer considered von Hippel's opinion, that this condition was due to an angiomatosis, as the most probable.

Thrombosis of Vorticose Vein.

A. W. Mulock Houwer presented a case of thrombosis of a vorticose vein. A carbuncle progressed from the forehead into the orbit. Exenteration of the orbit was done to save life, as the eye had become blind and appeared glaucomatous. Pathologico-anatomically the temporal vorticose vein was found thrombosed; its intraocular part was much dilated.

Method for Detection of Malingerers.

A. van de Moer has had an experience of at least 25 years as a military examiner. For some 18 years he has used his method among some 80 ways for detection of one sided diminution of vision or blindness. It is based on the fact that a colored glass conceals the complementary color, when the background is black, red letters on a black background are invisible thru a green glass, and vice versa. It is also known, that red letters on a white background cannot be seen thru a red glass. Green and blue on a white background are never invisible thru green or blue glasses, as von Haselberg mentions.

His method for detecting amblyopia in one eye, when the vision and fixation of that eye rests on this insufficiently appreciated circumstance, that while red letters on a white background become invisible thru a red glass, blue letters on a white background remain visible thru the blue and yellow glasses in the test cases. He writes blue and red letters on white paper. Some experiments can be done with the examinee, where it is indifferent if he closes one eye, because all colored letters remain visible thru blue or yellow glasses. To mislead, black letters are shown thru red glasses. The colored glass is held always before the best eye and the examinee thinks (and this is demonstrated to him, by closing the diseased eye for a moment) that he reads all letters with his sound eye. No glasses are held before the sick eye, so that this can be controlled constantly. Finally a red glass is held before the sound eye and the red letters which are now read must be seen by the alleged weak eye. If the examinee closes this eye the examiner, (an assistant holds the colored glasses before the sound eye) turns the page with the red and blue letters, which he has in his hands, so that the examinee is unable to determine what he sees with the weak and what with the sound eye.

The advantages of this method are that the weak eye remains uncovered and under control; that a malingerer must be well instructed before being tested; and that the armamentarium consists only of 3 glasses, red, blue, yellow, and a red-blue pencil.

DISCUSSION. Nicolai objected to the writing every time of the letters, which must impair the exactness of the determination of vision.

Van de Moer thought that less suspicion of the examinee is excited. During the demonstration Roelofs pointed out how the patient without closing one eye can become enlightened as to the question with which eye he sees certain letters.

Pupillary Reaction in Complementary Light.

H. WEVE related Behr's hypothesis of 1913; the nasal half of the retina stimulated produces only a direct pupillary reaction, while the response of the temporal half to the light stimulus is only indirect or consensual pupillary narrowing. This would be explained by a double complete crossing of the united pupillomotor fibres in each tract before reaching the nucleus of the sphincter pupillae. This did not concern the foveal part. He must suppose that the temporal and the nasal pupilomotor receive stimuli and are in relation with both nuclear zones. Behr did not consider, as did Hess, the first appearing then quickly decreasing contraction; but the pupillary width, to a certain extent, could be considered constant. It was not impossible that other reflex tracts were involved and a control investigation of Behr's observations was needed.

Behr's method could not be exactly followed, and the indirect reaction can only be studied in cases of one sided amaurosis with entirely normal pupillary reflex paths, with the other eye perfectly normal. This material is very scarce, as appears from Behr's cases, half of which are useless.

Weve sought a method wherewith he could measure the direct and indirect reactions in perfectly normal persons at the same time. Sachs and Hess have demonstrated that the pupillomotor action of rays of different wave-length is proportionate to the impression of brightness of these rays, and it is a fact that fovea and periphery of retina show the same adaptive symptoms with regard to the pupillomotor function as to the visual functions. Hence we may assume that the same retinal elements, which we consider as excited by the light stimulus, also act as exciting the pupil reflexes. Retinal elements, which are chiefly sensitive for light of large wave-length, are scarcely excited by light of small wave-length. Considering these facts, Weve could excite, alternatingly, after some changes of the binocular corneal microscope, the temporal and nasal halves of the retina of one eye, 20° from the fixation point and 8° above the horizontal meridian, with light of small wave-length (blue-green 445 to 560$\mu\mu$), while both eyes were illuminated with spectral-red (600-800$\mu\mu$) in entirely the same way.

The 24 eyes of 12 normal persons were excited during half an hour alternately temporally and nasally, with the light of small wave-length and a series of measurements of both pupils were made. Continuous small oscillations of measurements of both pupils were found in all. In 4 during the examination, a distinct regular enlargement of both pupils was seen. In a fifth case it was only slight, and in a sixth, one eye only enlarged. It already possessed "physiologically" a somewhat enlarged pupil. This shows that it is not allowable to draw conclusions from one observation, as Behr did. The observations must succeed each other quickly. Considering the dubious cases as "even" 7 times the "direct" late reaction was greater than the "indirect" and once the reverse. In 16 cases the direct was like the indirect. Parallelism between direct and indirect reactions for both retinal halves was found, in sharp contrast with what Behr thought he found in one sided amaurosis. The hypothesis of Behr can be considered hereby refuted.

Essence and Treatment of Scrofulous Eye Inflammations.

L. K. Wolff considers scrofulosis to be a particular form of tuberculosis of the lymph glands; mostly caused by the human form of the bacillus, sometimes by the bovine. The glands of neck and head are mostly affected, sometimes the axillary glands and those above and below the clavicle, rarely the inguinal glands. It would seem as if the glands in the thorax are not affected seriously. Changes in the lungs, demonstrable with percussion and auscultation, are very rare. (W. never found any.) Von Pirquet's reaction has taught that if we find these eye inflammations even without any other scrofulous signs, tuberculosis is present. This reaction is positive in 90 to 100%. In chronic infective diseases we know that immunity and hypersensibility reactions can be found together; that these reactions locally can be bound to determined organs or parts of organs; and that these reactions especially can appear where formerly such a disease process was located, but which became cured. If this knowledge is used in regard to phlyctenular inflammation then we must accept, that earlier in the life of the patient a tuberculous process must have been present, which has become cured thru the natural defensive forces of the organism. This eye has now become hypersensitive toward the tuberculous poison. We have only to accept that now and then tuberculous poisons become mobilized from out the tuberculous lymph glands. This will happen especially, when the outward circumstances are unfavorable. Schreiber has found in 25% of more than 200 cases of phlyctenular inflammation tuberculous foci (or the scars) in the retina or choroid. Wolff thinks rather that the phlyctenules are produced by dead bacilli or poisons, considering the transient process and the quick cure, and also those after tuberculin instillations.

Staphylococci can secondarily impair the patient's condition. We must therefore take these in consideration as regards the treatment. We can influence the process in two ways: by removal of the tuberculous foci, from which the poisons emanate, and thru lessening the tuberculin sensitivity of the eye. The last way has been tried —the tuberculin treatment. With the exception of rare communications in the literature of favorable results, the results have not been very good. Wolff has not seen any results from it. Surgical removal of tuberculous foci gives in many instances of scrofulosis good results.

Roentgen rays have also a good effect on these glands. Fourteen patients have been rayed, who suffered with repeated recurrences. One patient died. In 3 cases the result was not good. One of these had in one year one small phlyctenule and a recurring lymph node. The second patient went somewhere else. The third remained half a year without complaint after raying of the cervical nodes; but this was followed by another phlyctenular period. Cervical nodes can hardly be palpated, but the x-ray picture showed tuberculosis of the hilus glands. Raying of these gave freedom from phlyctenules for at least 4 months. In the other cases raying of the neck-glands had proven sufficient.

Raying took place every three weeks; with filtration by an aluminum filter and removal of the secondary rays with felt. No more than 4 H. was given as a dose. It may be necessary to repeat the series of rayings after a year. No bad results; except sometimes the patient had a dry mouth and some pain in the neck, sometimes the neck became a little thick and red. A few times there appeared a general reaction, fever, which soon abated. Once a phlyctenule appeared after the raying. Some were also generally benefited.

Besides the raying of the tuberculous glands the ocular complications must be treated. A 5% salve of fluoresceinas argenti (a red powder, which dissolved in distilled water, directly kills staphylococci) in white vaselin was applied every hour in the conjunctiva. It is painless and gave in some cases a very good result. It is also advisable for obstinate blepharitis. Of the 5 cases of benign ocular tuberculosis, 4 did not recur after raying, altho the process itself does not seem influenced in contrast with the phlyctenular inflammation. Wolff found that careful raying with not more than 1.5 H. in the 3 weeks and filtration thru 5 mm. aluminum does not harm the eye.

Discussion. Weve had good results with the arc-light in scleritis cases; the sittings are short and are cheap.

Wibaut asked if a local connection between phlyctenules and cervical lymph nodes is possible.

De Haas mentioned the good influence on the eye condition by the treatment of the scrofulous skin affections.

Roelofs asked why lymph nodes and not lung tuberculosis leads to eye inflammation, and pointed out the great importance of uncleanliness.

Mulock Houwer often saw among recruits scars of apparent tuberculous choroiditis.

Nicolai asked why bacterial poisons can give now insensibility, then again produce recurrences of phlyctenules.

Wolff had no personal experience with the arc-light; however, arc-light only enhances the general resistance, X-rays remove the tuberculosis focus and act deeper. He does not consider the skin efflorescences in the same line with the tuberculosis of the lymph nodes. He is unable to explain the reverse action of anaphylaxis and immunity. A local connection between eye affection and lymph node tuberculosis is improbable, because they did not appear always simultaneously.

Dr. Van Ree, who treated the patients, used very hard rays thru a filter of 1.5 mm. aluminum, a layer of leather, and sea-weed against the secondary rays; he rayed on both sides behind the angle of the lower jaw. In about 10 minutes 4 Holzknecht were given, with the direct raying of the eye 1.5 H. were given.

Intraocular Pressure with Ophthalmic Herpes.

G. ten Doesschate treated a man, 52 years old, who had suffered with scrofulosis and gonorrhea, who fell from his horse 7 years ago and was wounded on the right side of his nose and forehead. He always saw well (was a sharp-shooter), and received 4 years ago spectacles with both glasses the same. He suffers now with tuberculosis of the lungs and foot. On August 18 he had pain surrounding R. On August 20 he came under treatment for herpes zoster frontalis. The blebs on the forehead were hemorrhagic with very severe pains. On August 28 the eye began to protrude, the tension increased to 60 or 70 mm. Hg. and the pupil became wide. V. R. zero. L. with 0.75=7/6. The cornea was insensible and dull. Pilocarpin and eserin improved the tension only slightly (to 55 mm). As the exophthalmus was considered the cause of the rise of tension a sclero-corneal trephining was done, with the hope that a depletion of the aqueous humor thru the wound would take place until the exophthalmus would be reduced to normal. The tension became low, vision remained zero and the protrusion continued.

A few days later the eye was hard again, then the exophthalmus began to decrease, and the tension fell to normal, and even subnormal. The dull cornea became clear, the disc visible, perhaps slightly pale, but without excavation. The vision increased to 7/50. The field remained strongly contracted (chiefly the temporal part remained). A higher temperature was never found with the exophthalmus, and during the first days of the herpes eruption the temperature was not observed higher than 37.9° C. Only after 7 weeks the beginning of slight iridic symptoms was observed, which yielded to atropin. Sweating was now less on the right side of the head and a slight ptosis was present.

It is probable that the changes in ocular tension which originate thru trigeminus irritation depend on the sympathetic fibers, which are in connection with the first branch of the fifth nerve, and this would explain the changes of ocular pressure which are found with herpes zoster and which would then depend chiefly on disease of the sympathetic. The cases of herpes zoster frontalis, where hypotony is found, can be explained by supposing a sympathetic paralysis. In another case, which Dubois has described (1912) glaucoma was also found with exophthalmus, so that the speaker considered this abnormal position the cause for the glaucoma, as both arise and disappear pari passu.

The digital tonometry is here inaccurate, which may explain why these varieties of tension have been described so little. The hemorrhagic herpes vesicles point to an important injury of the vascular walls or vasomotors, which could produce an edema of the orbital contents.

The intention was to demonstrate that there could exist a close causal connection between herpes and glaucoma, and that the connection should not be looked for in a general morbid condition, as fever, but of more local nature.

Discussion. Verwey thought that Rochat had remonstrated that irritation of the sympathetic had produced rise of intraocular tension.

Ten Doesschate stated that this rise as found by Rochat is quickly followed by a lowering, and that this last is only observed in men.

Mulock Houwer saw a herpes zoster following a periodontitis, which also produced an exophthalmus, which he thought due to the collateral edema. The tension was normal.

Complete Homonymous Hemianopsia in the Puerperium.

H. Weve described this condition, which supports Endelman's opinion. It is connected with eclampsia; and shows with certainty the existence of a vertical dividing line thru the fixation point, with a very high, probably cortical, impediment of the optical paths. The determination of the localization was the only focal symptom; lues could be excluded; Wassermann negative, both blood and spinal fluid; antiluetic treatment without result; normal sella turcica; the phenomena remained the same since the beginning, 12 months before.

2. Hemikinetic pupil reaction was surely absent.

3. No atrophy of the optic nerves.

4. The sudden beginning during the puerperium and the same course as in the described 17 cases points to the same cause.

Consideration leads to the hypothesis that on the basis of "autointoxication" a vascular spasm originates, with or without secondary thrombosis. The observation is inconsistent with the double representation of the fovea.

In the nontraumatic "peace cases" of homonymous hemianopsia with high interruption, a central remaining field was always found; while in the traumatic "war cases" oftener complete hemianopsia has been observed, which may be due to a particular vascularization of the posterior pole and in the invulnerability of the region; which we have to learn to recognize as the probable projection of the fovea, especially thru traumatic homonymous central scotoma.

Discussion. Verwey, to his amazement, did not hear the theory of von Monakow mentioned.

Wibaut and Nicolai do not like to reject the theory of Wilbrand and Saenger entirely; altho the supposition of an individual difference for explanation of the presence of a sharp dividing line is not very acceptable.

Weve considers the rejection of von Monakow's theory by Brouwer sufficient, and it cannot keep its ground against the great number of known macular hemianopic scotomata. The theory of Wilbrand and Saenger, already improbable thru the mentioned auxiliary hypothesis, depends only on the findings of Ramon y Cajal of fiber division in cats, which is absent in dogs and rabbits.

Late Infection after Trephining.

H. F. Dubois had observed his patient since 1913. L. was trephined on August 5, 1916, under cocain anesthesia, the iris did not prolapse. Only next morning a very tiny prolapse existed under the conjunctiva, which was excised, after which the pupil became round again. On August 14, R. was trephined. Iris prolapsed and was cut off. In both eyes a slight iritis appeared, which healed in a few days with homatropin. Patient came on January 19, 1918, with pain in R. since a few days. Tension normal. Deep pericorneal injection and photophobia, ciliary body painful on pressure. Iritis with slightly cloudy aqueous; an iridocyclitis one year and a half after trephining. Scopolamin 0.2% 3 t. d., and 3 grammes aspirin daily, dark spectacles. Next morning the conjunctiva over the trephine opening was slightly touched with the galvanocautery. On January 23 patient could return home. Vision and field have not suffered; the condition remained unchanged the following 8 months.

Dubois considers application of the galvanocautery of high value.

Discussion. Tresling and Nicolai doubt somewhat the diagnosis of "late infection" on account of the benign character, and the absence of a perceptible continuity between scar and inflammation.

Mulock Houwer saw, 10 years after a trauma which had produced a filtrating scar at the corneoscleral junction, a purulent inflammation with hypopyon in the vesicle and in the anterior chamber. After opening and cauterization quick recovery.

Dubois saw the first redness at the place of the scar, and supposes therefore a connection. It was this time not a purulent but a more mild inflammation.

CHICAGO OPHTHALMOLOGICAL SOCIETY.

May 12, 1919, Dr. Heman H. Brown, in the Chair.

Visual Disability and Compensation.

Dr. Samuel G. Higgins, of Milwaukee, Wisconsin, (by invitation) presented "The Report of the Milwaukee Oto-Ophthalmological Society on Visual Disability from Eye Injury and Compensation to be Allowed by the Wisconsin Industrial Commission."

This report had been requested by the Industrial Commission of Wisconsin as they wished to establish an equitable settlement according to the enacted law for compensation for eye injury. Reference to other tables and attempts to apply a working basis for compensation was made in the paper to show that they were of the same idea in the fundamental estimation of vision. This paper is published in full, p. 813.

Discussion. Major Harry S. Gradle told of the "Compensation Table as Reported to the Chicago Ophthalmological Society" and published in the American Journal of Ophthalmology in July, 1918, p. 457.

The idea of the committee appointed to investigate the matter was to give recompense to the injured man based upon his earning capacity after his recovery from the injury. So many factors entered into the matter that no particular table could be prepared that would cover all cases. They tried to simplify and reduce to an arithmetic basis all the factors upon which the degree of the ocular efficiency of the injured rested, and divided all the results of injuries into ten main heads. He reviewed these different heads and stated that the committee did not attempt to say what compensation should be paid. It was not their rôle as ophthalmologists, because a man earning ten to fifteen dollars a week was not entitled to the same amount as the man earning thirty to forty dollars a week. The amount should be decided by the legislature and was usually based upon the weekly salary. They agreed with Dr. Higgins that 20/40 did not by any means represent a loss of 50 per cent vision, but they could not determine what it represented and had to accept it as 50 per cent loss until some other term was determined. The resultant vision must be taken and the vision of the other eye because compensation was based upon the ocular efficiency of the man, not upon the injury and what it was, but what the man could do with his eyes after recovery. In the case of a man who did fine work, it was necessary to find out how much depth perception he had and how much he had lost. In the human interest and cosmetic result, if the injury was disfiguring they were entitled to a certain amount of compensation for that alone, no matter what the injury to the eyeball might have been.

As to when the examination should be made—time was a factor; the man would probably think the vision was at the worst stage two or three days after the injury, while if it was something that cleared up slowly the employer would want it taken as late as possible, so they decided that at least two months should elapse between the time of the injury and the time upon which the record of vision was based. They believed this would give a fair idea of the resulting vision.

In the second class of cases with impairment of both eyes they placed the total compensation as three times that for one eye.

The committee still believed that the compensation must be based upon some such data as was contained in the table which they had submitted, altho it was not presented with any idea of its being accepted as final. The committee desired opinions upon that type of table and hoped that eventually there might be some unanimity of opinion among the ophthalmologists as to what was due for ocular injuries. There should be some definite idea so that a lay board might sit down and figure up just what a certain type of injury was entitled to. That would be the only way in which justice could be done to the employer and the employee. There was no table at present that could possibly be made to cover every case and there must be some method of taking into account all the things that represented the ocular efficiency of the injured.

DISCUSSION. Dr. Frank Allport said that he had listened to the argument of Dr. Gradle and also to that of Dr. Higgins in which they advocated the conclusion of the committee of the Chicago Ophthalmological Society and Barnes-Chapman Compensation Table, adopted in Milwaukee. Both of these tables contained many meritorious features, but they were both too complicated, too long, too involved and too complex to be understood by laymen and by many oculists. Compensation tables would have to be framed in such a way as to appeal to the average mind of the average industrial commissioner, lawyer and accident company. These men knew nothing about involved ophthalmologic subjects. What they wanted was something primer-like in its simplicity, and fair and honorable to all parties concerned in such matters. If a table of this nature could be devised and adopted, it would satisfy everybody and give litigation procedures at least some foundation upon which to go in cases where eyes had been injured. It could be taken as a foregone conclusion that if industrial commissions, lawyers and accident insurance companies were requested to adopt complicated recommendations, they would never adopt them at all and things would go on in their present unsatisfactory and chaotic condition. Both the recommendations suggested by Dr. Gradle and Dr. Higgins involved quite a number of points frequently present in cases of visual losses. He referred to progressive optic atrophy, high power convex lenses after cataract extraction, various forms of intraocular diseases, excessive lacrimation, etc. These were all important features and would have to be frequently taken into consideration, but most of them were matters that would have to be settled by expert medical testimony, and were not susceptible of being adjusted by rules or by compensation tables. He, therefore, thought it would be wise not even to mention matters of this kind at the present time because they only complicated the situation and rendered it more improbable that we should ever make a beginning in settling these complex issues. His own idea was for us to make a beginning with the hope that other things would follow. The most important point that came up in settling litigation, involving visual losses, was as to the amount of visual loss of one eye. He therefore felt that if we could arrive at some reasonably fair agreement concerning a compensation table for matters of this kind, it would be a great step in advance and after this one step had been taken, other steps would follow.

There seemed to be, at the present time, a general desire on the part of all parties concerned in litigation of this kind to adopt some simple table as a working basis to go on. He believed that if a table was suggested and endorsed by oculists it would find a ready adoption by industrial commissions, lawyers, insurance companies, etc., but we must never forget that a table of this kind must be absolutely simple, easy to understand and fair to both plaintiff and defendant. Unless a table of this kind was endorsed by oculists, it would never be adopted in litigation.

The table that he recommended was one suggested by Drs. Prince, Penick and Hagler of Springfield, Illinois. He had made one alteration in the Springfield table, and that was to endeavor to settle the question as to what constituted industrial blindness. The Springfield table indefinitely specified it as "nil," but he did not think that this was sufficient. He thought we should try, as he had said before, to settle what should be estimated as industrial blindness. Personally, he felt that if a man could not see the 200 test type at more than five feet he should be regarded as industrially blind—in other words, 5/200 should indicate industrial blindness. Of course, this was a point that might be argued pro and con—a man who had this amount of vision was, of course, not blind in the strict sense of the word, but he was certainly industrially blind, and could no longer do ordinary work in an ordinary way. He had been told by some prominent accident insurance men that they would endorse this view and personally he felt it was most generous and liberal of them to be willing to accept 5/200 as industrial blindness. He made, therefore, this important change in, what he called, the Springfield table—otherwise the matter was left just as devised by the Springfield doctors. He presented the table herewith:

Industrial blindness or 5/200 entitles an applicant to 100 weeks of compensation.

10/200 entitles an applicant to 75 weeks of compensation.

20/200 entitles an applicant to 50 weeks of compensation.

20/160 entitles an applicant to 40 weeks of compensation.

20/140 entitles an applicant to 35 weeks of compensation.

20/120 entitles an applicant to 30 weeks of compensation.

20/100 entitles an applicant to 25 weeks of compensation.

20/80 entitles an applicant to 20 weeks of compensation.

20/60 entitles an applicant to 15 weeks of compensation.

20/50 entitles an applicant to 10 weeks of compensation.

20/40 entitles an applicant to 5 weeks of compensation.

20/30 entitles an applicant to 2 weeks of compensation.

20/20 entitles an applicant to nothing.

In accordance with the law of the State of Illinois, a man who was industrially blind was entitled to 100 weeks of compensation for industrial blindness in one eye. This was a matter that we had nothing to do with; we could not change it because it was a part of the law of the state. Of course, other states had different laws, but they, at the present time, were working under the law of the State of Illinois. If, then, this point was settled and if they could agree that 5/200 constituted industrial blindness, the rest of the problem seemed to be perfectly easy—all they had to do was to use the Snellen test type and grade down the number of weeks of compensation until normal vision was reached, which, of course, entitled a person to no compensation whatever. This grading down of the weeks of compensation should be done as gradually as possible. He thought the Springfield table had done this fairly and about as accurately as it could be done.

There was one thing to be noted, that, inasmuch as the law of the State of Illinois entitled a person to 100 weeks of compensation for industrial blindness in one eye, it made it easy and possible for the estimation of the loss of vision by percentages; that is, one could call the number of weeks in the last column either weeks or percentage. For instance, a person who was industrially blind was entitled to 100 weeks of compensation and had 100 per cent loss of vision. A person whose vision was 10/200 was entitled to 75 weeks of compensation and had a loss of 75 per cent of vision. A person whose vision was 20/200 was entitled to 50 weeks of compensation and had a loss of 50 per cent of vision, etc. Of course, we were all familiar with the fact that at the present time we were obliged, in giving testimony, in cases of this kind, to estimate visual losses in accordance with the fractions derived from Snellen test type. For instance, 20/40 of vision at the present time was regarded as one-half loss of vision, and yet we knew perfectly well that a man who had 20/40 vision had not lost one-half of his vision. 20/50 of vision was regarded in our courts as a loss of three-fifths of vision, and yet we knew that a man whose vision was 20/50 had not lost three fifths of his vision, and yet this was the way we were practically obliged to settle cases of this kind.

This was obviously unfair and should not be allowed to continue. He thot there was practically no difference of opinion on this point—the only question was, what should we do to arrive at a conclusion that was fair? It was for this reason that he suggested the Springfield table. Some men imagined they were espousing the cause of the laboring men when they objected to such a small amount of money representing the various degrees of visual loss. This was a matter that we had nothing whatever to do with. This had all been settled by the legislators at Springfield under the Workmen's Compensation Law. Industrial blindness of one eye meant 100 weeks of compensation—no more and no less. He was quite willing to admit that he would not lose one of his eyes for this amount of money, and in a broad humanitarian sense he did not consider that 100 weeks of compensation represented a sufficient amount of money to reward a man for the loss of an eye, but we had nothing to do with that at all. The law could be changed, but until the law was changed, we would have to work under the law of Illinois and not in accordance with our own philanthropic ideas. Some people, in looking over the circulars issued by the various insurance companies, noted that under some kinds of policies a man received $2,500 for the loss of an eye, and under some other policies he received $5,000 for the loss of an eye, etc. That was all true, but one must remember that those circulars were printed to attract customers for high class and expensive insurance. Like most everything else in this world, if one paid a large amount of money for it, one would get a superior article, but one could not get a $75 suit of clothes for $25, and one could not be paid $5,000 for the loss of an eye if the compensation was to be paid under the Workmen's Compensation Act and if the insurance was paid, not by the individual who was injured, but by the man who employed him and by the accident insurance company. So arguments of this kind were worthless and had nothing to do with the case, and yet the speaker heard them indulged in by people frequently who did not understand the situation.

As a beginning, then, of a better and fairer basis and as a start toward introducing something that would enable doctors, industrial commissions, accident insurance companies, etc., to have something that might be used as a kind of working basis to go on, he proposed the adoption of this Springfield table, as modified by him, by the Chicago Ophthalmic Society: He believed that if we could only make a start and adopt this table, it would go a long ways toward assisting litigation and enabling interested parties in arriving at just and equitable conclusions concerning the subject of visual losses of one eye.

Dr. Frank Brawley felt that there was some justice in what Dr. Allport said about taking one step at a time, but the Springfield table seemed to him to cover such a small portion of the subject that he did not think the Chicago Ophthalmological Society should really accept it formally. As a scientific body they should give it more thought and produce something better. The table presented by Dr. Gradle could be simplified a little, but simply to take one side of the question without considering all the absolutely essential things that came up every time one went to the board, was impossible. It did not take in the various things that made skilled labor—stereoscopic vision and various things of that type. He did not feel that the table the committee presented was so very complicated; it could not all be carried in the mind, but a given case could be classified under its proper heading and then the calculation became very simple. If the Industrial Commission and the legislature would not accept anything but the Springfield table, perhaps it should be adopted. In testing for depth vision a very simple plan had been worked out at the medical research laboratory where he was, something much more simple than the Hering test. Two sticks were used and placed at different distances apart and the subject told which was the nearer. This was fairer than the Hering test. The thing to be determined was not what an injured man had lost in vision but what he had lost in earning power.

Dr. G. Henry Mundt liked Dr. Higgins' report; it seemed to be simple, he understood it, and he believed it was a table that they could really begin with. He agreed with Dr. Allport that it was only with considerable difficulty that the report of Dr. Gradle could be understood. He thought that instead of Dr. Allport's motion regarding the Springfield table, it would be a good thing for the society to ask the committee, if it still existed, to bring in a table which might have a little better starting basis. The table should be based upon the percentage basis. They need not pay any attention to the Illinois law other than the fact that anything that they accepted should conform to that law.

In his opinion, the time to determine vision should be when the injury had been completely recovered from.

Dr. Oliver Tydings thought a third thing should be taken into consideration; they had heard about the insurance companies and the commission, but he thought the taxpayer had not been represented as against either of these. Whenever industrial damage was taken into consideration they, as a progressive, civilized body, must assume certain responsibilities. This would afford a working basis for the insurance companies, the commission, and the people. Many people were dependent upon the state for a livelihood who had lost their earning ability thru industrial accident. The community, as a whole, bore a larger percentage than either the insurance companies or the employers of labor. The community had borne it all in the past, except the little that could be obtained by long litigation. He felt sure that every employer of labor today, without an exception, would accept the Springfield table, but it did not do justice either to the community as a whole or to labor itself. He hoped with Dr. Gradle and Dr. Brawley that the matter would be deferred until the subject could be intelligently acted upon.

Dr. Samuel G. Higgins thanked the society for the privilege of coming down to participate in the meeting and thought that among the things that had been arrived at was the fact that a complicated table could not be understood by any lay board. Therefore, he assumed that the society could well pass upon a point which they determined to be industrial blindness, and he would report to his society that 5/200 was a better standard than the 20/350 which they thought would be practical.

He also believed the point had been arrived at where they could interpret the Springfield table on a percentage basis and that they might adopt a table which might be the Springfield or the Milwaukee, and find that in the money paid the amount would be practically the same. A table of this kind might at this time or at any time be given to the courts or to the industrial commission as a working basis, and all other questions must be settled by the opinion of the oculist, and the oculist representing the injured man might express his opinion. An expert called in by the commission might express his opinion, and if the employer wanted still another man, that opinion might be recorded, as the oculists were united. In other words, science and the three opinions would not differ very much and they could be added and divided by three and the amount really awarded the man would be about the same. He thought the award in many ways was very liberal; in Illinois the award was $12, based upon 100 weeks, and in Wisconsin it was $9.40, based upon 140 weeks; so it was about the same.

In his opinion it would be well for the oculists to have a table of their own, in which they could offer their opinion on a given case. That might enter into the literature and be known to the board to be referred to, but that they should not ask the board to apply it except as deductions were made by some oculist. He considered stereoscopic vision negligible.

He hoped that the very simple matters and very practical questions had shed some light on the subject. He thought the oculists should fight out the question regarding the removal of cataract which resulted from injury.

Dr. Charles C. Clement thought it was impracticable to recommend a single report for the guidance of the Industrial Board and also for the guidance of the oculist. The board should have a simple report which they could work on and there should be another report for the oculist. The Industrial Board would not be able to understand a very complicated report, and simplicity should be the keynote of the report sent to them. He saw no reason why the society should not go ahead and lay the foundation by adopting the Springfield schedule for the guidance of the Industrial Board and then build on top of that as elaborate a report as they pleased for themselves.

Dr. H. H. Brown suggested that it would be well for Dr. Allport's motion to be so modified as to embody the Committee on Compensation Table and let them take up the report upon the Springfield table. He thought the work of the society should be considered and recognition should be made of that committee, as it still existed.

Dr. Frank Allport said that in making this motion he supposed that this committee, represented by Drs. Gradle, Brawley and Woodruff, had handed in their report to the society and had been dismissed. Dr. Allport said he had no desire of producing any embarrassment to this committee, and while he did not regard their report as a satisfactory solution of the subject, he would withdraw his motion and recommend that the matter be reconsidered by the committee, and hoped that they would regard with favor the Springfield table which he had brought to the notice of the society.

He wished to admonish the committee to give up the discussion of abstract and involved problems and to endeavor to bring in a report that could be understood by laymen of average intelligence.

Dr. Robert Blue considered it very essential to know for what purpose the table was to be compiled. Whether for the guidance of the insurance companies, the Industrial Board, or for the estimation of ocular efficiency by oculists. If for the laymen, it would be one thing and if for the oculists it would be another. If it was for the Industrial Board it should be as simple as possible. If for the guidance of the oculist in determining ocular efficiency, an accurate guide for judgment should be sought rather than mathematic simplicity.

ALFRED MURRAY, Sec.

BALTIMORE CITY MEDICAL SOCIETY

OPHTHALMOLOGIC SECTION

MEETING OF OCTOBER 15, 1919

Retinitis Circinata.

DR. HARRY FRIEDENWALD exhibited a case of retinitis circinata which showed marked edema of the retina, with numerous hemorrhages in a circular form about the macula. All physical examinations were negative.

Ptosis Operation.

Dr. Friedenwald read a report of cases of ptosis operated on by the Hess method. In the past most of his ptosis operations had been more or less unsatisfactory. In September he had operated upon two cases of congenital ptosis. The first was in a boy of four years of age, who had had a Beard operation about two years previously, with very disappointing results. But the operation by the Hess method had so far been very gratifying.

The second patient was a girl of four years of age, with congenital ptosis, who was also operated on by the Hess method, and he had been extremely well pleased with the results. He allowed the main sutures to remain in for two weeks. It had produced a fold of integument on the upper lid, but this was only noticed when the patient was looking down.

DISCUSSION: Dr. Theobald spoke of a case of bilateral ptosis, in which he had performed the Gruening operation on the right eye with fair results. On the other eye he has dissected out a longitudinal strip of tarsal cartilage from the inner surface, with suturing of the remaining portions on the conjunctival surface. The results in this eye were much better than in the first one. He had recently heard from the case and the patient was much more satisfied with the last operation.

Plastic Operation on Lids and Face.

CAPT. H. K. FLECKENSTEIN, who is stationed at Fort McHenry, said that most of the cases that he had to deal with were those of loss of tissue and cicatricial contraction. In most cases the scar tissue was dissected and as much removed as possible; and that any patients having old scars were given antitetanic serum several days prior to operation.

Most of the grafts for cicatricial entropion or remodelling of lids was done by free Wolfe grafts. The skin was prepared by cleaning and painting with 3½ per cent iodin. The cicatricial tissues removed, grafts were preferably taken from the upper lid and tension suturing utilized if necessary. The grafts were handled on gauze, not placed in salt solution, but transferred immediately to the area grafted. The threads were prepared in equal parts of wax and vaseline. In case the cilia were destroyed the margin of the brow was used in order to give a margin with hair. Extremely few graftings were lost by this method. He thought that neither the Esser nor the Thiersch grafts were quite as satisfactory, altho the Thiersch grafting may be performed under local anesthesia.

In cases of depression of the orbital wall under the temporal muscles, as much scar tissue as possible is removed. Then a piece of fascia lata is dissected and implanted in the depressed area. Bone or cartilage may be used, but the fascia lata seems to be more satisfactory.

In cases of destroyed conjunctiva, a form of dental composition is molded, and a Thiersch graft is put over the form and placed in position to be grafted, with the suturing of the lids over the form. These grafts usually take very rapidly.

This very interesting paper was discussed by Drs. Witham and Looper.

C. A. CLAPP, Secretary.

American Journal of Ophthalmology

Series 3, Vol. 2, No. 11 November, 1919

PUBLISHED MONTHLY BY THE OPHTHALMIC PUBLISHING COMPANY

EDITORIAL STAFF

ADOLF ALT,
Metropolitan Bldg., St. Louis, Mo.
M. URIBE-TRONCOSO,
143 W. 92nd St., New York City.
MEYER WIENER,
Carleton Bldg., St. Louis, Mo.
CASEY A. WOOD,
7 W. Madison St., Chicago, Ill.
HARRY V. WÜRDEMANN,
Cobb Bldg., Seattle, Washington.
EDWARD JACKSON, Editor,
318 Majestic Bldg., Denver, Colo.
CLARENCE LOEB, *Associate Editor,*
25 E. Washington St., Chicago, Ill.

Original papers and books for review may be sent to any member of the editorial staff Reports of society proceedings, correspondence, and other scientific communications should be addressed to the Editor.

Proof should be corrected and returned within forty-eight hours to the printer. Reprints may be obtained from the printers, Tucker-Kenworthy Co., 501 S. La Salle St., Chicago, Ill., if ordered at the time proofs are returned.

Subscriptions, applications for single copies, communications with reference to advertising or other business, should be addressed to

H. A. FOX, Manager, 7 West Madison St., Chicago, Ill.

ANIMAL EXPERIMENTATION IN OPHTHALMOLOGY

Ophthalmology owes much, directly and indirectly, to animal experimentation, and when properly conducted it is often a fertile source of information. When the ocular organism itself is chosen as the medium of research it is hardly necessary to point out that the feral or domesticated eyes chosen for the purpose should resemble as closely as possible those of man if one is to draw definite conclusions from such investigations.

Even a superficial student of the biology and histopathology of the visual apparatus in the so-called lower animals will soon be convinced that the manifest differences between the tissues and their reactions to morbid influences in the eyes of man, and of such creatures as the dog, mouse, rat, guinea pig, rabbit, frog, etc., make it highly improbable that a certain class of laboratory experiments and investigations can do more than suggest the possibility (in some instances the probability) that like conditions prevail in both. Conclusions drawn from this form of experiment are certainly open to serious doubt so far as their application to human experience is concerned. Indeed the employment for research purposes of animal eyes below the simian orders (and the more closely they approach the tissues of the higher apes the better) can have but little value for scientific conclusions in human pathology.

Altho years of valuable time and the concentrated energies of hundreds of observers have been expended during the past half century in attempts to apply lower animal evidence in human ophthalmology most of it has probably been wasted.

The chief workshop for promiscuous production of this sort has for several decades past been Germany. We all know how often the report of an "Arbeit" proposed by a teacher in some klinik or laboratory, and carried out by indefatigable students with an enthusiasm worthy of a better cause, has filled dreary pages of "Graefe's Archiv" or some other Teutonic journal.

In the course of time, absence of responsibility involved in this kind of research frequently led to an utter disregard of what may well be termed the "rights of animals." If the extent and character of the investigations called for twenty dogs, the question whether the sufferings or loss of eyesight of these highly-developed and sensitive animals justified the sacrifice, hardly formed part of the proposed examination. There was, indeed, always danger, especially in ophthalmic inquiries of an otherwise humane man forgetting his humanity.

We had an outstanding example of that result in the case of a member of the *Ophthalmologische Gesellschaft,* who reported (*Bericht,* 1913) his attempts, *à la* Tantalus, to produce myopia in monkeys. These animals were placed in cages so that they were compelled to look down at food placed near them, their refraction being (from time to time) worked out by skiascopy. This observer noticed an increase in the refraction which amounted in one case, *during seven months,* to 7 diopters, and in another instance to 5 diopters! To his everlasting credit, von Hippel, in the discussion, maintained that the experiments were unjustifiable on account of their extreme cruelty.

Another false position which the lower animal experimenter so often assumes is that all eyes—avian, amphibian, mammalian—are of equal value for his purposes. Of the hundreds of examples that might be quoted from the literature on this subject, a certain well known investigator publishes (but not in the English language) his "contribution to our knowledge of trachoma corpuscles." In the course of the experimentation smears were taken from the eyes of the following animals: the frog, toad, rat, guinea pig, rabbit, dog and ape, and man; and from 60 cases of trachoma, 6 of spring catarrh, 6 of catarrhal conjunctivitis and 4 of purulent conjunctivitis. Only in cases of trachoma, and of these only in 29 out of 160 cases, were the trachoma bodies found, whereas in other specimens were found pseudoinclusions, granulations of the cellular protoplasm resembling the trachoma bodies, but not to be confounded with them. It is no wonder that corresponding variations in the inoculation experiments were noticed in respect to the vernal catarrh and other conjunctivitides!

A dim recognition of the contention that human and lower animal eyes are not necessarily interchangeable in the laboratory sense appears now and then in the writings of investigators themselves. For example, Cords, in his recent studies of *scarlet red* (see that caption in the *American Encyclopedia of Ophthalmology*), admits that one cannot argue, at least so far as this much-vaunted agent is concerned, from the lower animal conjunctiva to the same structure in man.

Roemer (*La Clinique Ophtalm.,* October, 1906) demonstrated that by means of a powerful antipneumococcic serum rabbits can be absolutely immunized against the pneumococcus. And, further, in these immunized rabbits, he has not been able to produce the least inflammatory reaction in the rabbit's cornea. It is true that "serpiginous ulcer cannot be produced in the rabbit; but in apes, which are liable as are men to corneal suppurations, Roemer was able to bring about an immune condition, absolutely refractory to pneumococcic infection of the cornea." As one would expect!

Quite recently one German and one Japanese investigator—both of them lights in the world of Ophthalmology—discovered, after elaborate laboratory experiments on dogs, that ganglion degeneration of the retina and optic nerve atrophy is a common result of thyroid toxemia; and it seemed strange to them and to others that "one notices this sequel so infrequently in man." A study of the canine ocular apparatus might rather have caused remark if the human consequences had been otherwise.

That monkeys, especially the anthropoid apes, constitute expensive material and are difficult to obtain for laboratory observation, is really no argument at all for substituting dogs and guinea pigs; indeed it may well be an *argumentum pro.* There has been, we believe, too much irresponsible and unscientific experimentation (mostly perpetrated abroad) in the past, and too little attention paid to the regular continuous *clinical* study of human ophthalmic cases in public and private practice.

The objection to the mass of evidence presented to us in reports, especially of lower animal bacteriology and pharmacognosy, is not entirely that it is inhumane but that it is also incompetent, inadequate, and, therefore, unscientific. The results *may* be as stated, but since only careful and prolonged observations made by trained and competent observers of human and anthropoid animals can remove the doubt and clarify the obscurity, why meantime, worry the eyes and nervous system of the dog, the guinea pig, the rat, *et hoc genus omne?*

When, as now proposed, an investigation of eye problems is made on our Simian relatives, the same consideration should be shown as one would exhibit towards a man, a woman or a child. Indeed only properly trained teachers should be permitted to utilize for these purposes such an intelligent, nervous and high-strung animal as a monkey. In any event, however, we hesitate to believe it possible that *any* American, however thoughtless or enthusiastic, would be likely to emulate the exploits of our *Heidelberger Gesellschaft* colleague even to demonstrate the etiology of myopia in apes.

Investigations properly conducted along the lines and in the direction just indicated would have a real value in ophthalmology, and when actuated by adequate motives and surrounded by proper precautions would have the approbation of every well wisher of our specialty. C. A. W.

STUDENT ASSISTANTS

The apprenticeship method has been the forerunner of effective schools in many lines of technical teaching. In the past the best way to get an education in ophthalmology in America was to become an office assistant to one of certain good teachers of ophthalmology. Notable among such teachers were Elkanah Williams of Cincinnati, and John Green of St. Louis. To be a student of one of these men was almost a guarantee of professional success.

Many of these teachers are still living, and their number is increasing. It must be admitted that among those who take office assistants are some who are more intent on extending their practice, beyond the limits of what one man can attend to, than upon becoming efficient teachers of another generation of ophthalmologists. Still to assist one of these men gives a large clinical experience. Reading up the conditions seen and careful methods of work, will give the student the mastery of ophthalmology that he desires, while improving the service he gives to his chief.

It is often difficult for the would-be student assistant to get in touch with the older man who could utilize his services and give the needed instruction; and the busy practitioner who needs an assistant sometimes has great difficulty in finding the one he needs. The best way to indicate needs of this kind has been to place an advertisement in the Journal of the A. M. A., but this could generally carry little information regarding the qualifications possessed by an applicant or those expected of an assistant.

Within the past three months we have had letters from four ophthalmologists appealing to their personal friends to find the kind of assistant they needed; and in the same time we have heard from about double that number of doctors who wished to prepare for ophthalmic practice by service in the office of an ophthalmologist. Unfortunately in most cases the applicants did not fit the particular places offered.

If a larger number of such places and a larger number of applicants could be brought together, doubtless a larger proportion of the seekers would be satisfied.

The plan of individual applications does not lend itself to a full statement of needs, opportunities, and qualifications. We believe the interests of the oculists of the country would be better served by forming a register of applicants of both kinds, and by comparison of those for help, with those who offer service, there would be a better chance of securing a permanently profitable arrangement for both parties. Such a plan is now being worked out and put in operation. From subscribers to the AMERICAN JOURNAL OF OPHTHALMOLOGY the applications will be received and acted on without charge. To others there will be charged a small fee for registration.

It is not likely that all requests can at once be met with satisfactory assistants or positions; but we believe that this plan offers one more way in which this journal can be of real help to the profession.

E. J.

BOOK NOTICES

Eye, Ear, Nose and **Throat.** CASEY A. WOOD, M. D., D. C. L. Albert H. Andrews, M. D., and George E. Shambaugh, M. D. **Practical Medicine Series,** 1919, Volume III, 12 mo., 384 pages. Illustrated. Chicago. The Yearbook Publishers. .

The portion of this volume relating to the eye is edited by Dr. Wood, and comprises 180 pages, including about as much matter as one issue of this journal. It is evident that careful selection of the matter to be included in such a work is of the highest importance, and for this its editor is especially competent. To confine the list of topics to those really important, and treat of them with sufficient fullness to make the book really interesting and valuable is a task requiring the abilities of the veteran editor, and compiler of a great encyclopedia. It has been well performed.

The text is liberally illustrated, including several plates, one of them in colors, that have been used in this journal. Altho the material for this section has been found in journals published in many languages, most of it is drawn from publications in English. This is at it should be, and reflects the large proportion of the literature of ophthalmology that is now appearing in English.

Our readers will recognize many things of which they have read in these pages; but it is a work that can safely be recommended to those not familiar with the general literature of ophthalmology. It is well written and printed, and its size makes it convenient to carry in the coat pocket.

E. J.

Ophthalmological Society of Egypt. Bulletin of 1919, 146 pages.

This bulletin contains the sixteen papers read at the annual meeting of the Society, March 7th, 1919, with the discussions they elicited. Of these papers, five deal with various forms of conjunctivitis, and their effects, four take up various aspects of glaucoma and the Elliot trephining. The other consider sympathetic ophthalmia, autoserum in ocular therapeutics, infected corneal ulcer, a case of congenital defect of vision, and other subjects.

These papers are comparatively brief, practical and interesting. Some of them are illustrated by charts, and contain important tables. All but two are in English and these in French. Arabic has been used only in the inscription.

This Society, founded in 1902, now numbers 71 members. A list of these with the officers, and the business-like minutes of the annual meeting are included in the Bulletin. The absence of a table of contents or good index detracts from its value as a work of reference.

E. J.

Transactions of the Section on Ophthalmology of the American Medical Association, Annual Session, June 9 to 13, 1919. 8vo., 419 pages. Illustrated, Chicago, A. M. A.

The twenty-one scientific papers contained in this volume have been or will be published in the JOURNAL of the American Medical Association, or in the AMERICAN JOURNAL OF OPHTHAL-

MOLOGY; but about one-fourth of its pages are occupied by matter not elsewhere published. This includes discussions often more valuable than the papers that give occasion for them, since the discussion represents the wider experience and judgment of several, as against the experience and judgment of the single writer. The usual reports of committees, lists of members, and officers, and minutes of the session are also given here.

A new departure in the present volume is the reproduction of two colored plates, one of cysticercus, the other showing lens opacities, and the changes in them following the use of radium. In size and interest this volume compares well with its predecessors; and its table of contents and good general index qualify it as a book of reference that each American Ophthalmologist should possess.

E. J.

CORRESPONDENCE

Conservation of Vision

To the Editor: In my chairman's address at the Atlantic City meeting of the American Medical Association I called attention to the fact that the series of pamphlets on the Conservation of Vision, published by the Council on Health and Public Instruction of the American Medical Association, had been of great service to me in spreading the gospel of Conservation of Vision, among my patients and friends. Since the publication of my address in the *Journal of the American* Medical Association v. 73, p. 876. I have received so many leters inquiring where these pamphlets may be obtained, that I have suggested to Dr. Simmons that the work of the Council of Health and Public Instruction should be better advertised and that a few lines in the editorial pages with reference to the pamphlets above referred to, might be helpful.

It is possible that many of your readers may not know about the pamphlets, and would be glad to avail themselves of their help, if attention was called to them in your Journal.

Yours very truly,
CASSIUS D. WESCOTT.
Chicago, Illinois.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C. Volunteers are needed in other localities.

DEATHS.

Ambrose Kasson, Bath, New York, aged seventy, died at his home, September first.

Fred P. Lierle, Marshalltown, Iowa, aged forty-seven, died September 10th from pernicious anemia.

Joseph A. Kenefick, New York City, aged fifty-eight, died in Lawrence, Massachusetts, September 10th.

Arthur V. Fray, Chicago, aged fifty-five, died in St. Luke's Hospital, Chicago, September 7th, from carcinoma.

Howard F. Pyfer, Norristown, Pennsylvania, aged forty-seven, died at his home, September 5th, from bronchopneumonia.

Francis M. Smiley, Kewanee, Illinois, aged sixty, died in his office, September 15th, from cerebral hemorrhage.

Thomas J. McCoy, Los Angeles, Professor of Ophthalmology in the College of Physicians and Surgeons in the University of Southern California; eye and ear surgeon to a number of railways; well known as a specialist on the eye, ear, nose and throat; died at his home, October first, from angina pectoris.

PERSONAL.

Dr. W. A. Adams of Denver has taken offices in the Commonwealth Building.

Dr. Robert Randolph of Baltimore is still absent from his office on account of poor health.

Dr. Leon Block, Denver, announces the opening of offices in the Central Savings Bank Building.

N. Bishop Harman has been appointed Ophthalmic Surgeon to the National Institute for the Blind in England.

Dr. John W. Burke, Washington, D. C., has resumed practice at 1610 I street, N. W. He is no longer associated with Drs. Wilmer and Morrison.

Dr. H. O. Reik has been appointed secretary of the new postgraduate movement in New York City, and has left Baltimore to take up his residence in that city.

Dr. E. D. Everett, Capt. M. C., U. S. A., ophthalmologist to the General Hospital, No. 21, Carlisle, Pa., has returned from France, and is now located at Frostwood, Md.

Dr. J. E. Vallee, ex-house surgeon at the New York Post Graduate School and Hospital, announces his removal to Los Angeles, with offices in the Title Insurance Building.

The oculists of Baltimore are very glad to welcome Dr. Harry Friedenwald, lately returned from the Orient. Dr. Friedenwald has been elected vice-president of the Zionists of America.

Dr. Casey A. Wood will spend the next three months in Washington, D. C., completing his work on the Medical and Surgical History of the War. He stopped in Chicago two days on his way east from California.

Dr. Andrew Carr of Minot, N. D., returned from France, is now in charge of the Eye Department of the Illinois Eye and Ear Infirmary. Dr. Carr is also assistant to Dr. Brown in the Eye Clinic of the Medical Department of the University of Illinois.

Dr. R. A. Fenton of Portland, Ore., has resumed practice after 18 months service overseas with Base Hospital, No. 46. After the armistice he became consultant in Ophthalmology to the Army of Occupation in Germany, heading the eye work in the hospitals in Luxemburg.

At the annual tournament of the Chicago Physicians' Golf Association, September 30th to October 1st, the championship medal was won, for the fourth time, by Dr. Frank Brawley. Dr. Brawley was further honored by being made president of the association.

MILITARY NOTES.

Dr. William G. Bowerman has opened offices in Yonkers, N. Y., since retiring from service.

Dr. E. S. Adams, formerly of Pueblo, Colorado, has returned from military service, and opened offices in Trinidad.

Dr. Percival Dolman has returned to San Francisco, after fifteen months' service in the Medical Department of the U. S. army.

Major A. E. J. Lister, ophthalmic surgeon to King George's Medical College, has been appointed an honorary surgeon to His Excellency the Viceroy and Governor-General of India.

Dr. John M. Wheeler, who has been in charge of the eye service at Base Hospital, No. 2, Ft. McHenry, Md., was discharged, September 15th, and has resumed his practice at 80 West Fortieth street, New York. The Department in Ophthalmology at Fort McHenry had a large service in plastic surgery about the eyes.

The following ophthalmologists have been reported as returned from Government service: To New York City—Drs. E. G. Morton, F. Dunnington, Henry R. Skeel, J. F. Van Fleet, W. F. Steinbugler, D. T. MacPhail, L. W. Callan, C. A. McConville, S. T. Hubbard, Conrad Berens, Jr., J. S. Smith, J. F. Bowman, A. B. Bruner, L. E. Hetrick, G. F. Patton, E. B. Thompson, D. H. Webster, W. F. Macklin, F. W. Shine, Bernard Samuels, Catesby Jones, G. F. Gracy, Webb W. Weeks, D. P. Platt and G. H. Grout. To Brooklyn, N. Y.—Drs. J. E. Golding, C. A. Harget, James A. Bilello and E. C. Place.

SOCIETIES.

The first meeting of the season of the Chicago Ophthalmological Society was held on the evening of October 13th, when an unusually large number of interesting clinical cases were presented for examination.

An Ophthalmological Society has been formed in Bucharest, with Professor Constantinesco as president and Dr. Ghica as secretary. The society meets twice a month at the Coltzan Hospital and publishes its transactions twice a year.

The Section on Ophthalmology of the New York Academy of Medicine presented the following program on the evening of October 20th:

1. Presentation of patients.
   Extraction of cataract in a case of megalocornea, by Dr. Carl Koller.
2. Subject of the evening—"Postgraduate Teaching in Ophthalmology."
   a. Experiences based on the recent military course of instruction in ophthalmology. Dr. Meyer Wiener, St. Louis.
   b. Suggestions regarding the teaching of ophthalmology. Dr. F. H. Verhoeff, Boston.
   c. Discussion by Dr. Edward Jackson, Denver; Dr. G. E. de Schweinitz, Philadelphia; Dr. W. H. Wilder, Chicago; Dr. W. R. Parker, Detroit; Dr. J. E. Weeks, New York; Dr. Alexander Duane, New York; Dr. W. A. Holden, New York, and others.

The meeting was presided over by Dr. Arnold Knapp.

OPHTHALMIC LITERATURE

These lists contain the titles of all papers bearing on Ophthalmology received within the preceeding month. These titles are all in English, some of them modified to indicate more clearly their subjects. These subjects are grouped under appropriate heads, the succession of groups being the same from month to month. In the group the papers are arranged alphabetically usually by the name of the author in heavy-face type. After the subject of the paper (Ill.) indicates the number of illustrations. (Pl.) the number of plates, and (Col. pl.) colored plates illustrating the article. (Abst.) shows that it is an abstract of the original article. (Bibl.) tells that the paper is accompanied by an important bibliography. (Dis.) means that a discussion of the subject is published with it. Under Repeated Titles are indicated additional publication of papers already noticed. To secure the earliest possible notice writers may send copies of their papers, or reprints, to 318 Majestic Bldg., Denver, Colorado.

DIAGNOSIS.

Azmy, Y. Simulated Eye Diseases in Egypt. (Dis.) Bull. Ophth. Soc. Egypt, 1919, pp. 129-136.

Butterworth, A. K. Eyesight Tests for Railwaymen. Brit. Jour. Ophth., v. 3, pp. 460-461.

Cohen, M. Apparatus for Securing a Red-free Light for Fundus Examination. Arch. of Ophth., v. 48, p. 527.

Howard, H. J. Judgment of Distance with Semaphore and a Screen at 100 Meters. (3 ill.) Arch. of Ophth., v. 48, pp. 461-474.

Koller, C. An Improved System of Illumination for the Electric Ophthalmoscope. Amer. Jour. Ophth., v. 2, p. 703.

Korff-Petersen. Strength of Light Rays, Visual Acuity and Reading. Münch. med. Woch., 1919, 24. Abst., Woch. f. Therap. u. Hyg. d. Auges, v. 22, p. 159.

THERAPEUTICS.

Duran, B. C. Parenteral Injections of Milk with Eye Disease. Med. Ibera, v. 7, p. 183. Abst., Jour. Amer. Med. Assn., v. 73, p. 1020.

Jacovides. Autoserum in Ocular Therapeutics. Bull. Ophth. Soc. Egypt, 1919, pp. 80-85.

Johnson, J. A. Experiments on Rabbits with Salvarsan, Therapeutic and Toxic Doses. Amer. Jour. Ophth., v. 1, pp. 741-743.

Kerry, R. Iodin in Inflammation of the Eye. Brit. Jour. Ophth., v. 3, pp. 448-452.

Lundsgaard, K. K. K. Treatment of Eye Diseases by Parenteral Injections of Milk. Ugeskr. f. Laeger., 1919, 81, pp. 423-426.

Zbikowski, E. Quinin in Ocular Therapeutics. España Oft., July, 1919, p. 239.

Repeated Titles. **Gros and Fromaget.** (v. 2, p. 305) Brit. Jour. Ophth., v. 3, p. 473.

REFRACTION.

Clegg, J. G. Notation of Axes of Cylinders. (5 ill.) Brit. Jour. Ophth., v. 3, pp. 443-448.

Dameno, E. Refraction Findings in Malingerers. Prenza Med., Argentina, v. 5, p. 354.

Des Voeux, H. A. The Symptoms of Eye Strain as Met with in General Practice. Tr. Med. Soc., Lond., 1917-18, 41, pp. 204-219.

Eager, R. Early Treatment of Mental Disorders; Correction of Refractive Errors. Lancet, Sept. 27, p. 562.

Jackson, E. Etiology of Myopia. Amer. Jour. Ophth., v. 2, p. 700.

Lafon, C. Pithiatique Spasm of Convergence and Accommodation. Ann. d'Ocul., v. 156, pp. 449-475.

Stöhr, A. Physiologic Optics. (78 ill.) F. Deuticke, Leipzig.

Tscherning, M. Fitting of Glasses and Optical System. (3 ill.) Ann. d'Ocul., v. 156, pp. 498-506.

Wells, D. W. Round Spectacle Lenses. (1 ill.) Section on Ophth., A. M. A., 1919, pp. 386-388.

OCULAR MOVEMENTS.

Bard, L. Nystagmus from Rotation. Revue Neurolog., v. 26, p. 177.

Artificial Nystagmus of Rotatory and Vertical Types. Ann. de Méd., v. 6, p. 165.

Broome, F. C. S. Heterophoria. Jour. Roy. Nav. Med. Serv., Lond., 1919, pp. 175-179.

Castresana, B. New Operation for Strabismus. (95 p. ill.) Madrid, 1919. Abst., Jour. Amer. Med. Assn., v. 73, p. 461.

Cilleruelo. Modification of Terrien's Suture in Muscular Advancement. (1 ill.) Arch. de Oft. Hisp.-Amer., v. 19, pp. 489-492.

Dolman, P. Maddox Rod Screen Test. (Bibl.) Arch. of Ophth., v. 48, pp. 503-515.

de Kleijn. Reflex Action of Labyrinth and Neck on Eye Muscles. Arch. Neerl. de Physiol., 1918, 2, p. 644. Abst., Jour. Nerv. and Ment. Dis., v. 50, p. 268.

Lindgren, E. Amblyopia Ex Anopsia Cured after Six Years. Ugeskr. f. Laeger. Kobenh., 1919, v. 81, p. 366.

Report of Committee on Collective Investigation Concerning the Ocular Muscles. Section on Ophth., A. M. A., 1919, pp. 390-393.

Wright, E. W. One Eye a Necessity, Two a Luxury. Med. Council, v. 24, p. 749.

CONJUNCTIVA.

Archibald. Epithelial Xerosis of the Conjunctiva. Med. Jour. of Australia, Aug. 30, 1919, p. 177.

Bayer, W. G., and Herrenschwand, F. v. Pseudotubercle bacilli in Production of Conjunctivitis. Graefe's Arch. f. Ophth., v. 98, 3 and 4, 1919. Abst., Woch. f. Therap. u. Hyg. d. Auges, v. 22, pp. 155-156.

Chance, B. Trachoma in the Camps and Hospitals of the Army. Amer. Jour. Ophth., v. 2, pp. 693-694.

Diamere, V. Differential Virulence of Gonococcic and Purulent Ophthalmia. Arch. di Ottal., 26, pp. 45-48.

Eason, H. L. Ophthalmia in Egypt among Napoleon's Troops, 1799-1801; among British Troops, 1916-18. Bull. Ophth. Soc. Egypt, 1919, pp. 13-31.

Galindez, Rivero, J. Treatment of Trachoma. España Oft., July, 1919, p. 230.

Gamal ed Dine. Pseudomembranous Conjunctivitis. (Dis.) Bull. Ophth. Soc. Egypt, 1919, pp. 98-104.

Girgis, A. M. Prevalence of Spring Catarrh in Egypt. (Dis.) Bull. Ophth. Soc. Egypt, 1919, pp. 121-129.

Guglianetti, L. Action of the Meningococcus on the Eye. Riforma Med., v. 35, p. 662. Abst., Jour. Amer. Med. Assn., v. 73, p. 1167.

MacCallan, A. F. Causes of Nontrachomatous Ophthalmia in Egypt. Bull. Ophth. Soc. Egypt, 1919, pp. 32-43.

Causes of Blindness in Egypt. Bull. Ophth. Soc. Egypt, 1919, p. 137. Amer. Jour. Ophth., v. 2, p. 735.

Mouton. War on Trachoma in Amsterdam. Zeit. f. Schulgesundheitspfl., 1919, No. 2. Abst., Woch. f. Therap. u. Hyg. d. Auges, v. 22, p. 159.

Pereyra, G. Streptotrichosis of Conjunctiva. (2 pl., Bibl.), Arch. di Ottal., 26, pp. 1-20.

Sanson, A. D. de. Prophylaxis of Trachoma. Arch. de Med., Brazil., v. 9, p. 234.

Sauvineau, C. Antigonococci Vaccine and Blennorrhea. Clin. Opht., 22, pp. 458-460.

Sommer, A. Gonorrheic Conjunctivitis. Intravenous Injections of Arthigon. Dermatolog. Woch., 1919, No. 21. Abst., Woch. f. Therap. u. Hyg. d. Auges, v. 22, p. 153.

Thompson, M. M. Ophthalmia Neonatorum Cured by Radiant Light. Amer. Jour. Electrotherap. and Radiology, July, 1919, p. 209.

Weeks, J. E. Argyrosis of Conjunctiva and Cornea. Arch. of Ophth., v. 48, p. 527.

Winn, P. R. Trachoma on the Pacific Coast. Amer. Jour. Ophth., v. 2, pp. 702-703.

Zentmayer, W. Use of Ethylhydrocuprein. Amer. Jour. Ophth., v. 2, p. 695.

CORNEA AND SCLERA.

Aziz el Aouizy, A. Treatment of Infected Ulcer of Cornea with Subconjunctival Injections of Mercury Perchlorid. (Dis.) Bull. Ophth. Soc. Egypt, 1919, pp. 85-98.

Bentzen, C. F. Optochin Therapy of Serpiginous Corneal Ulcer. Ugeskr. f. Laeger. Kobenh., 1919, 81, pp. 418-423.

Dabney, S. G. Blue Cornea. Kentucky Med. Jour., v. 17, p. 396.

Dubois, H. F. Therapy of Hypopion Ulcer with Optochin. Nederl. Tijdschr. v. Geneesk., 1919, 1, pp. 1219-1225.

Fischel, A. Influence of the Eye on Development and Composition of Cornea. Klin. M. f. Augenh., 1919, 62, pp. 1-5.

Fox, L. W. New Operation for Conical Cornea. (5 ill.) Amer. Jour. Ophth., v. 2, pp. 738-740.

Hegner, A. Severe Necrosis of the Cornea in a Case of Salvarsan Poisoning. Klin. M. f. Augenh., Nov.-Dec., 1917. Abst. Brit. Jour. Ophth., v. 3, p. 470.

Hoeg, N. Tuberculous Parenchymatous Keratitis Treated with Tuberculin. Ugeskr. f. Laeger, Kobenh., 1919, 81, pp. 412-417.

Langdon, H. M. Hypopyon Ulcer of Cornea Treated by Chauffage. Amer. Jour. Ophth., v. 2, p. 698.

Lindgren, E. Treatment of Proliferating Maculae Corneae by Conjunctival Transplants. Ugeskr. f. Laeger, 1919, 81, pp. 412-417.

McDannald, C. E. Twin with Interstitial Keratitis. (Dis.) Arch. of Ophth., v. 48, p. 523.

Menacho, M. Transparent Scleral Cyst. (4 ill.) Arch. de Oft. Hisp.-Amer., v. 19, pp. 486-488.

Nance, W. O. Treatment of Serpiginous Ulcer of Cornea. Illinois Med. Jour., v. 26, pp. 182-184.

Szymanowski, K. Pathology of Scleritis. Klin. M. f. Augenh., v. 62, pp. 21-30.

Stähli, I. Microcornea. Klin. M. f. Augenh., March-Apr., 1919. Abst., Woch. f. Therap u. Hyg. d. Auges, v. 22, pp. 154-155.

Verhoeff, F. H. Keratitis Profunda (or Disciformis?) with Microscopic Examination. (1 pl.) Arch. of Ophth., v. 48, pp. 449-460.

Weeks, J. E. Maculoanesthetic Leprosy of Brow and Cornea. Arch. of Ophth., v. 48, p. 527.

Zentmayer. Congenital Pigmentation of the Sclerotics. Amer. Jour. Ophth., v. 2, p. 694.

Repeated Titles. **Kraupa.** (v. 2, p. 467) Ann. d'Ocul., v. 156, p. 234. **Rönne.** (v. 2, p. 468) Brit. Jour. Ophth., v. 3, p. 469.

ANTERIOR CHAMBER AND PUPIL.

Blake, E. M. Cilium in the Anterior Chamber. Arch. of Ophth., v. 48, p. 526.

Cabannes. Pupil Accommodation and Convergence Reflexes. Jour. de Méd. de Bordeaux, v. 90, p. 314. Abst. Jour. Amer. Med. Assn., v. 73, p. 1093.

Demaria, E. B. Experimental Hydatidosis in Dog. (15 ill.) Arch. de Oft. Hisp.-Amer., v. 19, pp. 461-487.

Guglianetti, L. Viscosity of the Aqueous Humor. Arch. di Ottal., v. 26, p. 53.

UVEAL TRACT.

Davis, A. E. Tuberculosis of the Choroid. Arch. of Ophth., v. 48, p. 525. Uveitis. (Dis.) Section on Ophth., A. M. A., 1919, pp. 305-315.

Leoz Ortin. Tuberculous Iritis with Gummatous Keratitis. Med. Ibera, v. 7, p. 204.

Samperi, G. Pneumococcic Metastatic Ophthalmia in Influenza. (2 ill. Bibl.) Arch. di Ottal., 26, pp. 19-44.

Zentmayer. Uveitis with Disciform Opacities. (Dis.) Amer. Jour. Ophth., v. 2, pp. 694-695.

Repeated Titles. **Urra.** (v. 2, p. 550) Jour. A. M. A., v. 73, p. 1096.

SYMPATHETIC DISEASE

Böhm, K. Sympathetic Ophthalmia in Spite of Preventive Enucleation. Klin. M. f. Augenh., 1919, Feb. Abst., Woch. f. Therap. u. Hyg. d. Auges, v. 22, p. 156.

Peters, A. So-called Sympathetic Irritation. Münch. med. Wochenschr., 1918, 65, pp. 1370-1373.

Sobhy. Sympathetic Ophthalmia Diagnosed Microscopically. (Dis.) Bull. Ophth. Soc. Egypt, 1919, pp. 43-50.

Repeated Titles. **Dor** (v. 2, p. 307), Brit. Jour. Ophth., v. 3, p. 472. **Schevensteen** (v. 1, p. 813), Brit. Jour. Ophth., v. 3, p. 465. **Schieck** (v. 2, p. 173), Brit. Jour. Ophth., v. 3, p. 463.

GLAUCOMA.

Abboudy, A. Incision of Ciliary Body in Hemorrhagic Fulminating Glaucoma and Diabetes. Bull. Ophth. Soc. Egypt, 1919, pp. 77-79.

Relation Between Syphilis and Glaucoma. (Dis.) Bull. Ophth. Soc. Egypt, 1919, pp. 59-64.

Dubois, H. F. Late Infection in Scleral Trepanation. Nederl. Tijdschr. v. Geneesk., 1919, 1, pp. 1234-1236.

Herbert. Future Glaucoma Operation. (Dis.) Arch. of Ophth., v. 48, p. 518.

Knapp, A. Spontaneous Reduction of Tension in Glaucoma. Arch. of Ophth., v. 48, pp. 525-526.

Muttayya, V. G. Glaucoma. Antiseptic. Edinb. and Madras, 1919, 16, pp. 47-57.

Peter, L. C. Buphthalmos: Results of Posterior Sclerectomy and Optical Iridecomy. Amer. Jour. Ophth., v. 2, pp. 695-696.

Smith, P. Tonometric Values. Brit. Jour. Ophth., v. 3, pp. 476-480.

Sobhy, M. Elliot's Trephining in Chronic Glaucoma. (3 ill. Dis.) Bull. Ophth. Soc. Egypt, 1919, pp. 63-76.

Weeks, J. E. Personal Observations Regarding the Treatment of Glaucoma. (Dis.) Section on Ophth. A. M. A., 1919, pp. 371-385.

Young, G. Results of Double Sclerectomy Operation for Glaucoma. Arch. of Ophth., v. 48, p. 518.

Zaki Seddik. Late Infection after Trephining. (Dis.) Bull. Ophth. Soc. Egypt, 1919, pp. 50-58.

CRYSTALLINE LENS.

Clark, C. F. Coloboma and So-Called Congenital Dislocation of the Lens. (1 ill.) Arch. of Ophth., v. 48, pp. 475-484.

Cohen, M., and Levin, I. Action of Radium on Cataract. (Dis. 1 pl. with 24 ill.) Jour. A. M. A., v. 73, pp. 1193-1200. Section on Ophth., A. M. A., 1919, pp. 202-221.

Darier, A. Surgical Treatment of Cataract. Clin. Opht., v. 22, pp. 439-458.

Gonzalez, J. de J. Spontaneous Rupture of Morgagnian Cataract. Amer. Jour. Ophth., v. 1, p. 743.

Olivares. Suture of Cornea in Cataract Extraction. España Oft., July, 1919, p. 217.

Scheer, W. M. van der. Cataractous Lens in Mongolian Idiocy. Klin. M. f. Augenh., 1919, Feb. Abst., Woch. f. Therap. u. Hyg. d. Auges, v. 22, p. 153.

Schweinitz, G. E. de, and Wiener, M. Anterior Lenticonus (1 ill. Dis.) Jour. Amer. Med. Assn., v. 73, pp. 1191-1192. Section on Ophth., A. M. A., 1919, pp. 325-330.

Weeks, J. E. Cholesterin Crystals in Hypermature Cataract. Arch. of Ophth., v. 48, p. 527.

RETINA.

Angelucci, A. Sight for the Blind. Arch. di Ottal., v. 26, pp. 49-52.

Blue, R. Family Degeneration of the Macula Lutea. (Dis.) Section on Ophth. A. M. A., 1919, pp. 191-201.

Buck, R. H. Recurring Spontaneous Retinal Hemorrhage of Tuberculous Origin. Amer. Jour. Ophth., v. 2, pp. 731-735.

Cobb, P. W. Dark Adaptation. (5 ill.) Arch. of Ophth., v. 48, pp. 492-502.

Collins, T. Abiotrophy of the Retinal Neuroepithelium, or Retinitis Pigmentosa. (Dis.) Arch. of Ophth., v. 48, pp. 517-518.

Eason, H. L. Congenital Cone Blindness. Bull. Ophth. Soc. Egypt, 1919, pp. 105-108.

Elschnig, A. Tumor-like Thickening in Macula Lutea. Klin. M. f. Augenh., 1919, Feb. Abst., Woch. f. Therap. u. Hyg. d. Auges, v. 22, p. 154.

Jackson, E, and Finnoff, W. C. Tuberculosis of Retina. (1 Fig., 2 pl.) Amer. Jour. Ophth., v. 2, pp. 715-722.

Lodge, O. Nature of Retinal Function. Jour. Amer. Med. Assn., v. 73, p. 1299.

Marin Amat. Marcus Gunn Syndrome. España Oft., July, 1919, p. 231.

Peter, L. C. Unusual Case of Perivasculitis. Amer. Jour. Ophth., v. 2, pp. 696-697.

Roelofs, C. O., and Zeeman, P. C. Vision in Semidarkness and Nightblindness. Nederl. Tijdschr. v. Geneesk, v. 1919, p. 2101.

Schweinitz, G. E. de, and Wiener, M. Congenital Multilocular Cysts in Relation with the Retina. (1 ill.) Dis. Jour. Amer. Med. Assn., v. 73, pp. 1189-1190. Section on Ophth., A. M. A., 1919, pp. 322-325.

Repeated Titles. **Darier** (v. 2, p. 308), Brit. Jour. Ophth., v. 3, p. 471.

TOXIC AMBLYOPIAS.

Addario La Ferla, G. Ocular Symptoms in Saturnism. (Bibl.) Arch. di Ottal., v. 26, pp. 76-92.

Haas, H. K. de. Arsenic as Cause of Diseases of Retina and Optic Nerve. Graefe's Arch. f. Augenh., v. 99, part 1, 1919. Abst., Woch. f. Therap. u. Hyg. d. Auges, v. 22, p. 158.

Jamieson, T. H., and Lindsay, W. I. Effects of Long Continued Dosage with Quinin. Jour. Roy. Army Med. Corps, Lond., 1919, 32, pp. 295-306.

OPTIC NERVE.

Bollack, J. Papillary Stasis in Cerebral Tumor. Clin. Opht., 22, pp. 460-465.

Existence of Specialized Papillary Vessels in Optic Nerve. Klin. M. f. Augenh., 1919, Feb. Abst., Woch. f. Therap. u. Hyg. d. Auges, v. 22, p. 156.

Fleming, L. B. Can Simple Concussion of the Brain Give Rise to Optic Neuritis? Brit. Jour. Ophth., v. 3, p. 453.

Imamura, S., and Ichikawa, K. Familial Atrophy of the Optic Nerve with Tremor and Mental Impairment. Rev. Neur., 26, p. 277. Abst., Jour. Amer. Med. Assn., v. 73, p. 1166.

Langdon, H. M. Sudden Loss of Vision from Acute Sphenoiditis: Recovery. Amer. Jour. Ophth., v. 2, pp. 697-698.

Rönne, H. A Typical Case of Retrobulbar Neuritis. Klin. M. f. Augenh., v. 62, pp. 51-59.

White, L. E. Loss of Sight from Retrobulbar Neuritis due to Posterior Sinus Disease. Boston Med. and Surg. Jour., v. 181, pp. 483-490.

VISUAL TRACTS AND CENTERS.

Charlin, C. Bilateral Hysteric Amblyopia after Trauma of Face. Rev. Med. de Chile, v. 47, p. 365.

Coutela. Visual Troubles in Head Injury. Ann. d'Hyg., v. 29, p. 55.

Dameno, E. Blindness with Diabetes Insipidus in a Boy of Ten. Prenza Med., Argentina, v. 5, p. 345. Abst., Jour. Amer. Med. Assn., v. 73, p. 1020.

Perthes. Removal of Tumor of Choroid Plexus. Münch. med. Woch., 1919, 25. Abst., Woch. f. Therap. u. Hyg. d. Auges, v. 22, pp. 157-158.

Santos Fernandez, J. Homonymous Hemianopsia and Trauma of the Occipital Region. Arch. de Oft. Hisp.-Amer., v. 19, p. 492.

Schweinitz, G. E. de. Ocular Phenomena in the Psychoneuroses of Warfare. (7 ill.) Arch. of Ophth., v. 48, pp. 419-438.

Sym, W. G. Visual Orientation and its Disturbance. Edinb. Med. Jour., v. 23, p. 145.

Throckmorton, T. B. A Case of Tumor of the Pons Varolii. Jour. Amer. Med. Assn., v. 73, pp. 1279-1280.

Wilson, J. A. Gunshot Injuries of the Cortical Visual Areas. (5 ill.) Brit. Jour. Ophth., v. 3, pp. 453-459.

COLOR VISION.

Gjessing, H. Color Perception and Color Blindness. Tidsskr. f. d. norske Laegefor., 1918, 38 pp. 857-874.

Holth, S. Holmgren's Worsted Skeins or Stilling's Plates in Testing for Color Perception. Tidsskr. f. d. norske Laegefor., 1918, 38, pp. 553-560.

Schiötz, I. Studies and Tests of Color Perception. Tijdschr. f. d. norske Laegefor., 1919, 39, p. 41.

EYEBALL.

Grimsdale, H. Early Case of Mules' Operation. Brit. Jour. Ophth., v. 3, p. 452.

Ochi, S. Experimental Study of Histogenesis of Eye Abnormalities in the Chick Embryo. (4 ill. Bibl.) Brit. Jour. Ophth., v. 3, pp. 433-443.

Sondermann, R. Modified Exenteration and Enucleation. Klin. M. f. Augenh., v. 62, pp. 78-83.

THE LACRIMAL APPARATUS.

Atkinson, D. T. Abnormalities of the Lacrimal Apparatus. Western Med. Times, v. 39, pp. 129-130.

Fernandez, F. M. Gonococcus Dacryocystitis. Cron. Med.-Quirurg., v. 45, p. 135.

Galindez Rivero, J. Treatment of Dacryocystitis. España Oft., July, 1919, p. 229.

Green, J. Jr. Treatment of Dacryocystitis by Curettage. (4 ill., Bibl.) Amer. Jour. Ophth., v. 2, pp. 723-730.

Heermann, J. Suppuration of Tear Sac from Wound of the Antrum of Highmore. Cured by West's Operation. Klin. M. f. Augenh., v. 62, pp. 88-90.

Löhlein, W. Hereditary Dislocation of the Orbital Tear Gland. Münch. med. Woch., 1919, 24. Abst., Woch. f. Therap. u. Hyg. d. Auges, v. 22, p. 157.

LIDS.

Bell, G. H. Cutaneous Horn. Arch. of Ophth., v. 48, p. 523.

Angioneurotic Edema of Lids. Arch. of Ophth., v. 48, p. 523.

Dabney, S. G. Deformity of Lower Eyelids. Kentucky Med. Jour., 17, p. 396.

Davis, A. E. Double Congenital Ptosis. Arch. of Ophth., v. 48, p. 525.

Ekdawi, A. Y. Modification of Panas' Operation. (Dis.) Bull. Ophth. Soc. Egypt, 1919, pp. 109-113.

Esser, I. F. S. Inversion of Lids with Abnormal Growth of Lashes. Klin. M. f. Augenh., 1919, Feb. Abst., Woch. f. Therap. u. Hyg. d. Auges, v. 22, p. 154.

Hessberg, R. Operative Correction of Ectropion of Lower Lid at Inner Canthus. Klin. M. f. Augenh., v. 62, pp. 84-88.

Mahfouz, M. Grafting Peritoneum of Frog for Trichiasis. (Dis.) Bull. Ophth. Soc. Egypt, 1919, pp. 113-120.

Marquez. Congenital Coloboma of Upper Lid. Arch. de Oft. Hisp.-Amer., 19, p. 494.

Mendicini, A. Tonic Unilateral Spasm of Eyelids. Policlinico, v. 26, p. 286.

Zentmayer, W. Congenital Ptosis. Motais Operation. Amer. Jour. Ophth., v. 2, p. 695.

Bilateral Congenital Entropion. Amer. Jour. Ophth., v. 2, p. 694.

ORBIT.

Dabney, S. G. Venous Thrombosis or Orbital Cellulitis. Kentucky Med. Jour., v. 17, p. 389.

Lemaitre, F., and Brémond, M. Mucocele of Ethmoid. (5 ill.) Ann. d'Ocul., v. 156, p. 475.

Lindgren, E. Fat Transplantation into Tenon's Capsule after Enucleation. Ugeskr. f. Laeger. Kobenh., 1919, 81, pp. 363-366.

Magee, R. S. Traumatic Pulsating Exophthalmos. Amer. Jour. Ophth., v. 2, p. 744.

Montoya y Florez, J. B. Exophthalmic Goiter in Colombia. Rev. Clin., Med., v. 2, p. 1. Abst., Jour. Amer. Med. Assn., v. 73, p. 1251.

Tyson, H. H. Spontaneous Pulsating Exophthalmus. Arch. of Ophth., v. 48, pp. 523-525.

Van Iterson, C. Mucocele of Ethmoid. Nederl. Tijdschr. v. Geneesk, 1918, v. 1, p. 83.

PARASITES.

Holth, S. Filaria Loa in Orbit. Norsk Magazin Laegevidensk., v. 80, p. 939.

Schweinitz, G. E. de, and Wiener, M. Cysticercus in the Vitreous. (1 ill. Dis.) Jour. Amer. Med. Assn., v. 73, pp. 1187-1189. Section on Ophth., A. M. A., 1919, pp. 316-322.

TUMORS.

Hough, P. B. Orbital Tumor. Arch. of Ophth., v. 48, p. 526.

Lloyd, R. I. Phantom Intraocular Tumor, Multilocular Cyst of Iris and Ciliary Body. (1 ill.) Arch. of Ophth., v. 48, pp. 489-491.

Marongiu, L. Melanocarcinoma of Lower Lid. (8 ill. Bibl.) Arch. di Oftal., v. 26, pp. 67-75.

Schoenberg, M. J. Bilateral Glioma of Retina Apparently Arrested in the Non-Enucleated Eye by Radium Treatment. (Dis.) Arch. of Ophth., v. 48, pp. 485-488, and 522.

Uhthoff, W Radiotherapy of Bilateral Glioma with Anatomic Examination. Klin. M. f. Augenh., v. 62, pp. 6-20.

INJURIES.

Buckley, J. H. Foreign Body in Eye Nearly 29 Years. Amer. Jour. Ophth., v. 2, p. 746.

Derby, G. S. Ocular Manifestations Following Exposure to Poison Gas. (Dis.) Amer. Jour. Ophth., v. 2, pp. 685-687.

Greenwood, A. Primary Treatment of War Injuries to Orbit. (Dis.) Amer. Jour. Ophth., v. 2, pp. 687-689.

Kingston, G. A. Eye Injuries. Proc. Internat. Assn. Indus. Accid. Bds., 1917, Wash., 1919, 4, 269-281.

Perol, P. and Bazin, G. Localization of Foreign Bodies in the Eye. Jour. d. Radiol.; v. 3, pp. 303, and 310.

PATHOLOGY.

Suganuma, S. Microscopic Findings in Neurorecidive in Eye after Injection of Arsaphenamin. Japan Med. World, Aug. 31, 1919.

GENERAL DISEASES.

Bell, G. H. Relation of Teeth, Tonsils, and Intestinal Toxemias to Diseases of the Eye. (Dis.) Section on Ophth., A. M. A., 1919, pp. 266-293.

Binet, L. The Oculo-Cardiac Reflex. Presse Méd., v. 27, p. 462. Abst., Jour. Amer. Med. Assn., v. 73, p. 1094.

Gonzalez, J. de. J. Ocular Complications of Mexican Typhus. Anales de Soc. Oftal. Mex., August, 1919, pp. 173-195.

Levi-Sander, E. Sanitarium for Tuberculosis of the Eye. Klin. M. f. Augenh., 1919, 62, p. 120.

Patton, J. M. Ocular Manifestations of Lethargic Encephalitis. Nebraska State Med. Soc. Jour., v. 4, pp. 265-269.

Roorda Smit, J. H. Negative Wassermann Reaction with Ocular and Cerebral Syphilis. Nederl. Tijdschr. v. Geneesk., 1919, v. 1, p. 2256. Abst., Jour. Amer. Med. Assn., v. 73, p. 1172.

Schweinitz, G. E. de. Ocular Phenomena in the Psychoneuroses of Warfare. (Dis.) Amer. Jour. Ophth., v. 2, pp. 691-693.

Sinclair, W. Eye Complications in Cerebrospinal Meningitis. Arch. of Oph., v. 48, p. 519.

Terson, A. Ocular Localizations and Complications of Polymorphous Erythema. Paris. Méd., v. 9, p. 178. Abst., Jour. Amer. Med. Assn., v. 73, p. 1247.

HYGIENE.

Balfour, A. Problems of Hygiene in Egypt: Ophthalmic Hospitals. Lancet, Sept. 13, 1919, pp. 468-9.

Guijarro. Ocular Hygiene. España Oft., July, 1919, p. 230.

OPHTHALMIC SOCIOLOGY.

Cantor, S. J. The Education and Care of the Blind. Med. Jour. of Australia, Sept. 6, 1919, pp. 191-195.

Parker, W. R. Observations of an Administrative Officer. (Dis.) Amer. Jour. Ophth., v. 2, p. 685.

Parsons, J. H. Eyesight Tests for Railwaymen. Brit. Jour. Ophth., v. 3, p. 460.

Report of the Committee on Prevention of Hereditary Blindness. Section on Ophth., A. M. A., 1919, p. 389.

Titles of Communications. Brit. Jour. Ophth., v. 3, p. 461.

Wilder, W. H. Requirements of Ocular Examinations for the Army. (Dis.) Amer. Jour. Ophth., v. 2, p. 684.

Wilmer, W. H. Ocular Functions of Aviators. Arch. of Ophth., v. 48, pp. 439-448, and p. 519.

Report of the Committee on Knapp Testimonial Fund. Section on Ophth., A. M. A., 1919, p. 394.

EDUCATION, HISTORY AND BIOGRAPHY.

Danis, M. Belgian Society of Ophthalmology. Amer. Jour. Ophth., v. 2, pp. 699-700.

Jackson, E. To Avoid Professional Ruts. Amer. Jour. Ophth., v. 2, p. 701-702.

Ophthalmologists and the Royal Colleges. Brit. Jour. Ophth., v. 3, pp. 459-460.

Report of the American Board of Ophthalmic Examinations. Section on Ophth., A. M. A., 1919, pp. 395-396.

Terrien, F. Ophthalmology in 1919. Paris Méd., v. 9, p. 173.

AMERICAN JOURNAL OF OPHTHALMOLOGY

Vol. 2 DECEMBER, 1919 No. 12

TREATMENT OF CHRONIC DACRYOCYSTITIS

W. L. Benedict, M.D., and R. A. Barlow, M. D.

ROCHESTER, MINN.

This paper prepared by cooperation of the Sections on Ophthalmology and on Otology, Laryngology and Rhinology of the Mayo Clinic includes a general discussion of the subject and the description of a preferred method of operation.

Inflammation of the lacrimal sac may be said to have become chronic when the function of the drainage apparatus cannot be restored by the use of medical or hygienic measures, and operative procedures have to be employed either to restore the function of the duct or to remove the sac and obliterate the duct. Malformation of the puncta, eversion of the lids, simple stenosis of the duct, or obstruction of the lacrimal meatus in the nose, may be responsible for epiphora at any age, without inflammation of the sac, while acute or chronic inflammation may arise without complete closure of either end of the drainage system.

Stenosis of the duct in infants seldom results in suppurative affection of the sac but may often cause collections of large amounts of secretion that distend the sac, producing a mucocele and often a permanent fistula through the skin. Such a mucocele may extend backward, involving a part of the ethmoid labyrinth, or even extend into the orbit. Obstruction in children may follow edema and secondary inflammation of the duct from syphilitic periostitis, without other obstruction. The lacrimal sac in such cases may become secondarily infected and produce a purulent secretion. The sac is quite troublesome and difficult to heal except by vigorous antiluetic treatment.

If we may draw a conclusion from the comparative occurrence of purulent discharge in cases of obstruction of the lacrimal system we may say that chronic suppurative dacryocystitis in children is more often the result of disease of the structures about the lacrimal duct and sac than of congenital or acquired anatomic obstruction to the patency of the system.

The proportion of suppurative conditions of the sac in the adult is reversed. Obstruction to the flow of tears follows atresia of the puncta, eversion of the lids, or intranasal blocking. With the latter cause the closure of the canal is usually found in the duct at the point of least diameter, 10 mm. to 15 mm. below the upper end of the duct proper. Rarely we may find the entire duct occluded and contracted to a small fibrous cord. The secretion collecting in the sac regurgitates into the conjunctival culdesac, or it can be thus emptied by external pressure. Occasionally the obstruction may be in the canaliculi, and the collected secretion expressed through a stenosed duct or artificial opening into the nose. Both the upper and the lower openings may be closed, leaving a blind pouch which becomes an immense mucocele or which may rupture externally, producing a permanent fistula.

The treatment of chronic dacryocystitis is ultimately surgical. The procedure to be employed will depend on the nature and position of the obstruction, the extent of the involvement of contiguous structures, and the changes in the tissues produced by the disease or by previous treatment. The inflammation may be of low grade, producing a mucopurulent discharge without redness, pain, or heat, showing only a moderate and varying swelling and loss of function. Atony of the muscles of the lid and the muscle of Horner may fail to empty the sac completely and a passive dilatation of the sac results. The contents may be expressed easily.

Collection of secretion purulent or nonpurulent will, if rapidly produced, set up signs of active inflammation which gives rise to acute exacerbations. Removal of obstruction to the intranasal portion of the duct and careful use of small probes will be sufficient in many instances to reestablish patency of the duct. Further attention, such as irrigations and local application of antiseptic and astringent lotions, may be employed until the lining of the duct is in a more nearly normal condition. If the inflammation has existed for a long time, if there have been frequent attacks of acute inflammation, or if a quiet dacryocystitis has been unsuccessfully treated by the use of large probes, such simple measures as would be given to the lower end of the sac with the use of small probes will not insure a permanent opening, and it will be necessary to employ more radical measures.

Primary disease of the sac, that is from foreign material having become lodged in the sac or duct, producing stenosis and permitting secondary infection, may become so extensive as to occlude the entire duct and set up a periostitis and disease of the contiguous accessory sinuses. This is seen frequently in cases of traumatism of the nose and orbit from a kick in the face by a horse, or other accident, in which the head has suffered a crushing injury. On attempting to sound such a duct the sounding instrument will encounter bare bone, loose pieces may be felt to move, and the instrument may be passed beyond the lacrimal fossa into the opened cells of the accessory sinuses, and even into the nasal cavity beneath the nasal mucosa. If the nasal mucosa is also broken the secretion may empty directly into the nose. That this does not always follow is sufficient evidence that operative procedures intended to produce such and only such an opening are inadequate, whether the opening is made with a probe, a trephine, or a chisel.

Secondary disease of the sac may follow disease of the accessory sinuses. We have been slow to recognize the importance of this fact because of the difficulty of diagnosing disease of the anterior ethmoid cells. Little evidence of ethmoid disease may be found by inspection of the nasal chambers at the time of examination. The nose may appear negative, yet in such cases we frequently have demonstrated mucopurulent secretion with destruction of the lining of the cells, when we have made an external opening for extirpation of the sac. Inflammations of this nature are, of course, quiescent; they may exist for years without giving sufficient evidence of disorder to warrant exenteration. Drainage is established through or around the sac, and the mucopurulent secretion is expressed into the conjunctival culdesac. Most of the secretion comes from the changed mucosa of the sac itself, and removal of the sac may close the drainage and so cover the evidence of ethmoid disease. Occasionally, however, a permanent fistula may be established thru the skin, thru which the mucopurulent secretion of the diseased ethmoid cells escapes.

A suppurative ethmoid may, by its close relation to the lacrimal groove, set up an inflammatory process in the duct or sac which sooner or later may become purulent. The ethmoiditis may be of very low grade, and give no intranasal manifestation of its presence, but in time the presence of the pus may cause inflammatory reaction in the lacrimal duct which in turn may lead to stenosis, predisposing to a suppurative condition in the sac.

Pus may find its way into the lacrimal duct through the meatus, where there is a suppurative sinusitis with free drainage into the nose. Under such conditions the patient in blowing the nose forces the pus into the duct. Simple extirpation of the sac does not remove the evidence of chronic dacryocystitis in such cases. We admit the truth of the statement so frequently made, that if all the sac is removed the discharge will stop, but we are referring to the cases in which healing does not take place when the sac is totally destroyed or removed.

To dispose of the troublesome and dangerous secretion in chronic dacryocystitis is the high aim of treatment. If at the same time the function of the duct can be restored a double aim will have been accomplished. To this end various operations have been devised, but insufficient consideration has been given the changes which must be made in the tissues involved, for after all either the offending part is removed completely, or the elements are so rearranged that nature will not be impeded in providing protection for healthy organs and other tissues. To remove or to destroy a sac is to admit inability to cope with the disease of the tissues involved. The function of a stenosed and diseased lacrimal sac can often be restored by an operation no more difficult to perform than that of extirpation of the sac.

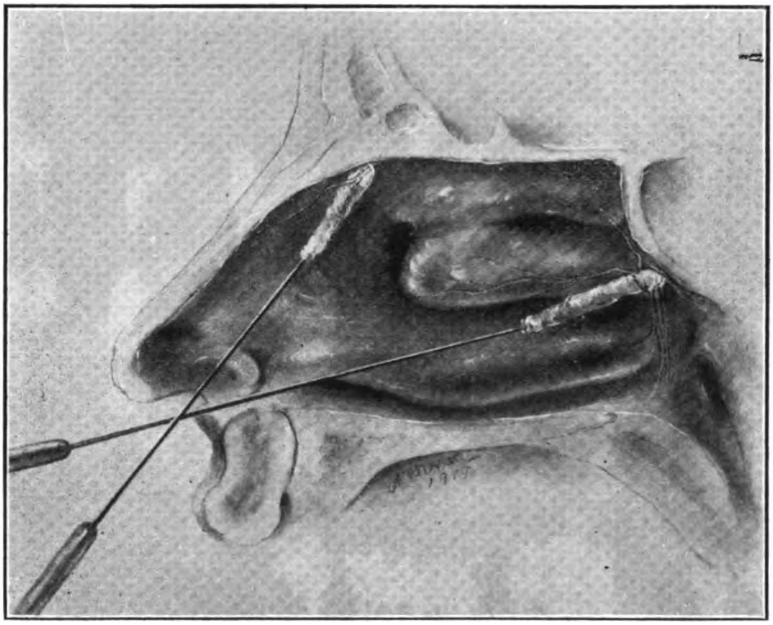


Fig. 1. Showing method of applying cocain mud with adrenalin to sphenopalatine ganglion and anterior ethmoidal nerve, giving complete anesthesia.

As has been mentioned, function may be restored in some cases by removal of low nasal obstruction and the careful use of small probes. The use of large probes, however, should be avoided in all cases. If a canal or bony foramen needs to be enlarged, it should be done by an open method, using cutting bone instruments, and not blindly by forcefully probing, crushing and tearing tissues that cannot be seen, and are only indefinitely felt. To attempt the treatment of chronic dacryocystitis by use of large probes either to enlarge the duct or to make an artificial opening into the nasal chamber is unwarranted and unjustified by the results obtained. If false passages are made into the antrum or soft tissues of the cheek, troublesome complications may follow. The use of metal styles is happily on the decline but they are now encountered sufficiently often to warrant mentioning the dangers accompanying their use and to urge better surgical methods of securing the same result.

Destruction of the sac by actual or potential cautery accomplishes only one thing, it stops the secretion from the tissues destroyed. It does not allow inspection of the tissues surrounding the sac either from within or without. It does not aid in reconstruction. No attempt is made to restore function to the sac. It is as difficult to destroy the sac by cautery with good cosmetic effect as it is to extirpate the sac, and the latter procedure has the added advantage of allowing inspection of the fossa and the bony duct, leaving nothing to be desired from the cosmetic standpoint.

Extirpation of the sac after the method of Meller gives most satisfactory results in most cases. After the sac has been removed a sound should be passed along the entire bony surface of the fossa and upper part of the duct in a search for openings into accessory cells and pieces of loose or necrotic bone. If any opening is found it should be enlarged, and the cavity from which it leads explored and cleaned. If only one or two cells can be found to be involved, and the disease is not then giving rise to a purulent discharge the whole cavity may be irrigated with 1:2000 bichlorid of mercury solution, and the wound closed in the usual manner without drainage. If the bone is necrotic or if pus is present in the ethmoid cells the loose bone should be removed, the diseased cells broken down, and an opening made through the nasal mucosa. The external wound may then be closed and the ethmoid disease treated from within the nose.

Operations for the restoration of function of the sac and duct, as well as the cleaning out of any diseased ethmoid cells, are advocated from time to time and have more to be said in their favor than any other form of treatment of chronic dacryocystitis. We are convinced that it is not neces-

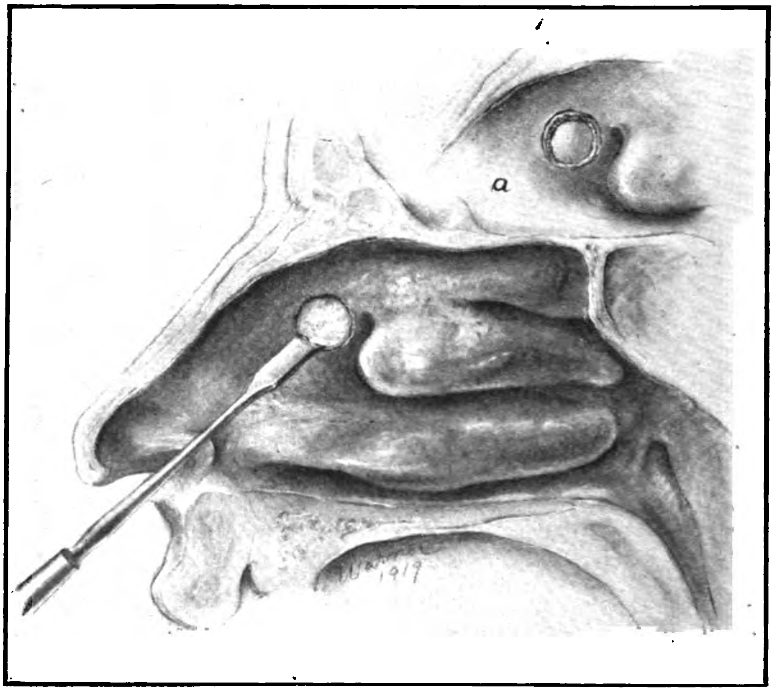


Fig. 2. Mucous membrane flap removed, exposing bone ready to be chiseled. a. Bone removed, exposing nasal wall of lacrimal duct and sac.

sary in the majority of cases to do a radical operation from the external surface. Plastic operations intended to restore function are unnecessary, besides being difficult to perform and involving a great deal of after treatment. When the sac and upper portion of the duct has not been destroyed, it may be tapped from the nasal side, by a procedure that at the same time will allow exposure of the anterior ethmoid cells and take care of any other intranasal obstruction.

If a sound can be passed through the sac and into the upper part of the duct the sac should not be extirpated, but an attempt should be made to restore the function of the duct by intranasal dacryocystostomy. The operation should be done by one who is familiar with intranasal technic. If for any reason the operation should not accomplish the re-

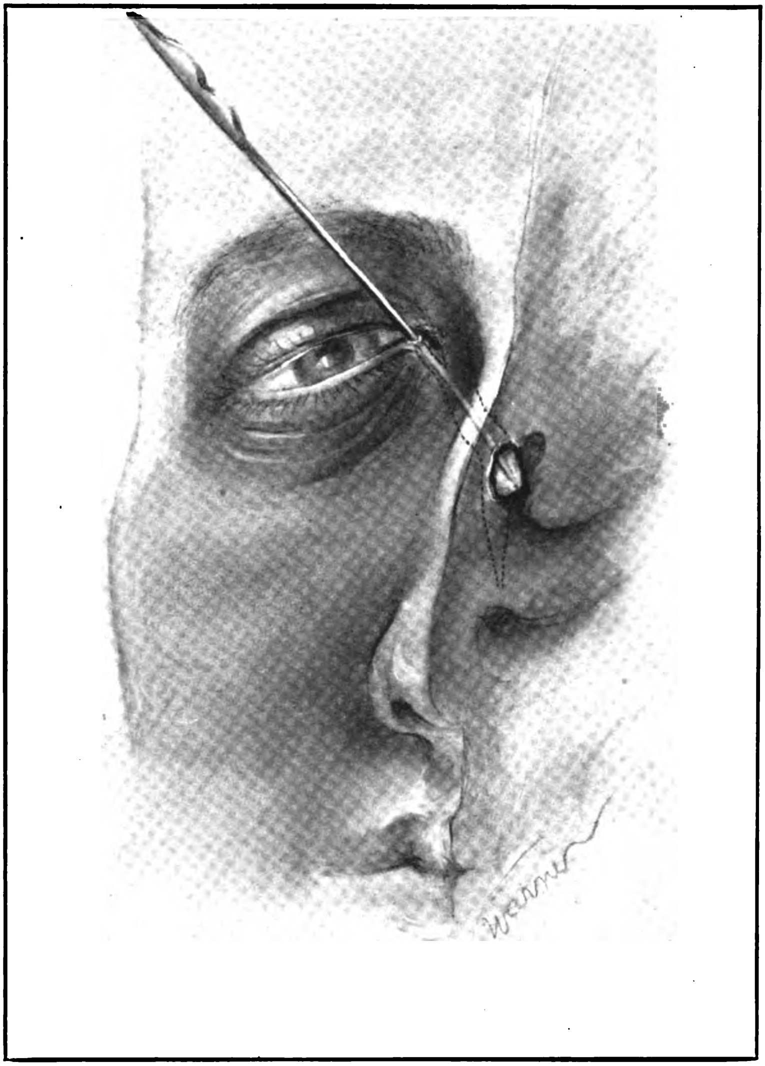


Fig. 3. Probe inserted thru inferior punctum, extending it into the sac; and tenting it thru window opening into the nose.

sult desired the sac can always be removed later. West, Yankauer, Paterson and Fraser, and others report excellent results. They have restored function to the lacrimal drainage system in a large percentage of cases in which operation was done, which is vastly more than can be said for the extirpation or cautery method of treatment.

An operation which restores function of the sac and provides adequate drainage of diseased ethmoid cells in the neighborhood of the duct, should any be present, should be easy to perform and unattended by complications that will require long after treatment. Such an operation may be described as follows:

OPERATION.

Two or three drops of 1 per cent cocain solution are instilled into the eye. This allows the probe to be introduced into the punctum with little or no discomfort.

The intranasal anesthesia is obtained by blocking the sphenopalatine ganglion and the anterior ethmoidal nerve by introducing a cotton applicator impregnated with cocain mud with adrenalin as the solvent, beneath the posterior end of the middle turbinate, and a second applicator passed between the septum and the middle turbinate to the cribriform plate as may be seen in Figure 1. These applicators are allowed to remain in position ten minutes, which ordinarily gives complete anesthesia of the nasal chamber. In case of high or anterior septal deflection a submucous resection of the septum should be done at this time.

A lacrimal probe is now introduced through the lower punctum (without slitting the canaliculus) into the sac and duct as far as it will go, and allowed to remain. This serves as a guide and landmark. The surgeon while working in the nose is thus constantly reminded of the direction of the duct.

The mucous membrane of the agger nasi is now elevated and resected

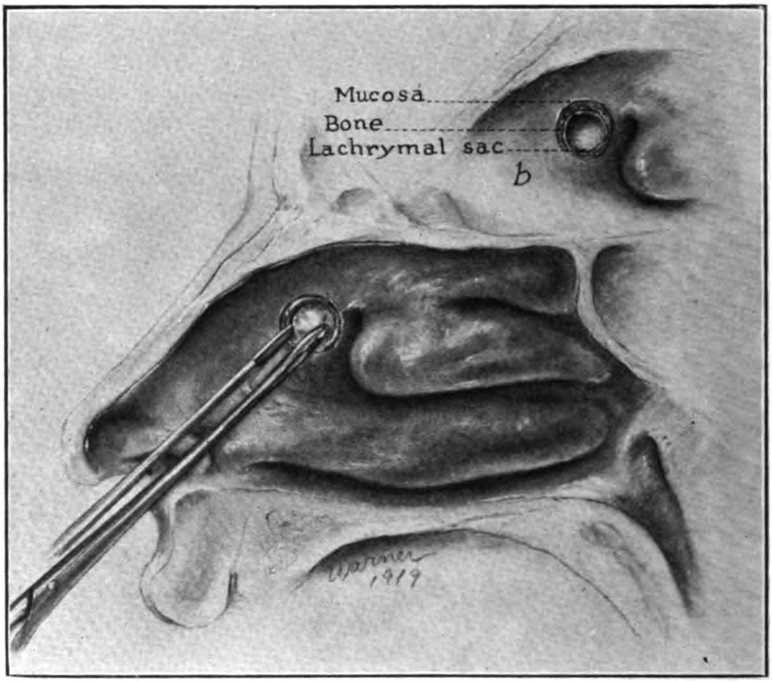


Fig. 4. Sac wall tented thru window opening, grasped by forceps, and beginning incision. b Window opening into sac completed, draining freely into nose.

and a flap about 1 cm. in diameter is removed just in front of the attachment of the middle turbinate. The bone is next removed by means of a small chisel to make a window slightly smaller in diameter than that of the mucosal opening (Fig. 2). This exposes the inner wall of the lacrimal sac and the upper part of the duct (Fig. 2a). Any diseased ethmoid cells which are discharging their contents into the duct can be easily broken down at this time.

The lacrimal probe is now withdrawn slightly until the tip causes a tenting of the sac wall into the opening made through the bone (Fig. 3). With a small knife the sac is incised (Fig. 4), the flap is grasped with a fine forceps, and the incision continued in a circular path, completely removing this portion of the sac wall (Fig. 4b). The probe is now removed, and the sac irrigated through the punctum.

This completes the operation and gives adequate drainage into the nose. Very often a quantity of pus escapes into the nose when the first incision is made into the sac wall. The after treatment is almost nil. No packing is necessary. The patient should be cautioned not to blow the nose vigorously, as the secretion from the nasal chamber may be blown through this new opening into the conjunctival sac. The reaction is very slight, healing is rapid, with little contraction of the mucous membrane. The patients experience no epiphora nor other discomfort after the operation. A lotion of zinc sulphat and adrenalin solution is used for the first week following operation, after which time no further treatment is needed.

REFERENCES

1. Paterson, J. V. and Fraser, J. S. Intranasal Dacryocystostomy: Intranasal Drainage of the Lacrimal Sac. Brit. Jour. Ophthal., iii, 197-204, May, 1919.
2. West, J. M. Die Eröffnung des Tränensackes von der Nase aus in über 100 Fällen von Dakryostenose. Berl. klin. Wchnschr., 1, 926-927, May 19, 1913.
3. Yankauer, S. The Technic of Intranasal Operations upon the Lacrimal Apparatus. Laryngoscope, xxii, 1331-1346, Dec., 1912.

A SIX METER STEREOSCOPE

Captain Harvey J. Howard, M.D., Oph.D.

PEKING, CHINA

The instrument here described was developed to meet the requirement for tests of binocular vision used at the Medical Research Laboratory of the Air Service Medical at Hazelhurst Field, Mineola, N. Y.

For the purpose of examining candidates for the flying service to learn their ability to judge distance, it was deemed necessary by the Eye Department of this laboratory to devise a test which could be used at a distance of six meters.

In a previous report (see p. 656) a description of an apparatus designed to make such a test was given. That apparatus was simple and crude, but at the same time gave very consistent results. The test was so planned that the only factor examined was the binocular parallax which is the most important personal factor in the judgment of distance. The results obtained with the apparatus were in the form of threshold judgments of certain depth-differences. From these threshold findings, together with the measurements of interpupillary distances the minimal binocular parallactic angles (see Fig. 2 and Fig. 3, p. 661) of all the subjects examined were computed (Table 1, p. 663). In this previous report it was recommended that a normal binocular parallactic angle be considered not larger than 8 seconds, when employing a similar apparatus. Based upon the size of their respective angles, it was found possible to classify men into groups, indicating their degree of depth judgment efficiency.

The findings obtained showed that very fine discriminations in depth perceiving ability were made possible by this apparatus. It therefore seemed advisable to employ the same principles in designing a more durable and compact apparatus which would be simpler to operate and permit of two methods of experimentation, instead of only one. The first apparatus required the operator to stand beside it, adjust the objects and lift a screen for each observation. In addition to this method it should be possible for the subject himself to adjust the objects into what he thinks is the same reference plane, i. e. equidistant from the eyes. After a series of such judgments, the average error would indicate his judgment threshold.

The apparatus recommended* consists of four essential parts:

1. An oblong box divided into two compartments with a window in one end.
2. A pair of round rods of equal diameter to serve as the test objects.
3. A stationary scale for recording the position of the rods.
4. A mechanism for the transmission of motion to the rods.

DESCRIPTION OF THE APPARATUS IN DETAIL.

1. The Box.

Figure 1 is a representation of the box in perspective. The inside dimensions show a length of 60 cm., a width of 24 cm. and a height of 20 cm.

A vertical milk glass partition divides the box into two compartments, viz., the front 40 cm. long and the back compartment 20 cm. long. In addition there is an elevation of the front end of 8 cm. above the top surface of the box. This is for the purpose of screening the mechanism on top of the box from the view of the observer. One side of the box is made removable. In the middle of the front end is a window 8x12 cm. The interior surface of the front compartment, the margins of the window and the anterior surface of the front end of the box are all painted a dead black. The interior surface of the back compartment is painted a dead white. Near the rear of the back compartment are set two frosted, cylindrical electric lamps which are connected to an ordinary wall plug. Each lamp has a reflector facing the front to give high and equal illumination on the milk glass. Covering the window from behind is a Graflex shutter capable of any time exposure desired up to 1/1000 of a second.

In the top of the box are cut two parallel slits, each 12 mm. wide, extending from the front end of the box to the milk glass partition. The lateral distance between the middle points of the slits is 6 cm.

2. The test objects are two round wooden rods which are viewed thru the window in the front end of the box when the shutter is open. Each of the rods is 18 cm. long and 1 cm. in diameter. In order to be exactly duplicated they are made in a milling machine. At one end each rod is modelled to screw into a wooden or metal block (A, Figs. 3 and 4) which carries it in a vertical position along one of the parallel grooves. When set in the carrying block the lower end of each rod is about 1 cm. from the floor to give opportunity for unrestricted play and easy removal. The rods are painted a dead black or some other neutral color.

3. On top of the box, extending in the median line the length of the front compartment, is a millimeter scale. The zero mark on the scale is located at the center of this compartment, viz: 20 cm. in front of the milk glass partition.

4. The mechanism for the transmission of motion to the rods is shown in Fig. 2. This mechanism consists of several parts:

(a) Each of the two sliding blocks (A) is 20 cm. long and 4 cm. wide and is made to fit a groove cut in the top (B) of the box. According to Fig. 4

---

*Authority to make, according to specifications, granted June 9, 1919, to Bausch & Lomb Optical Co., by the Supply Department, Hazelhurst Field, Mineola, L. I., N. Y.

there are three holes (1, 2 and 3) drilled in the under surface of each block to receive a rod 1 cm. in diameter. This makes it possible to put one rod in the extreme anterior position on one block and the other rod in the extreme anterior position of the other block, so that a total antero-posterior separation of about 36 cm. may be obtained. Attached to the upper surface of each sliding block and opposite each one of the three possible positions of the rod is a scale marker or indicator which projects toward the median line of the box over the millimeter scale. During an experiment only that scale indicator

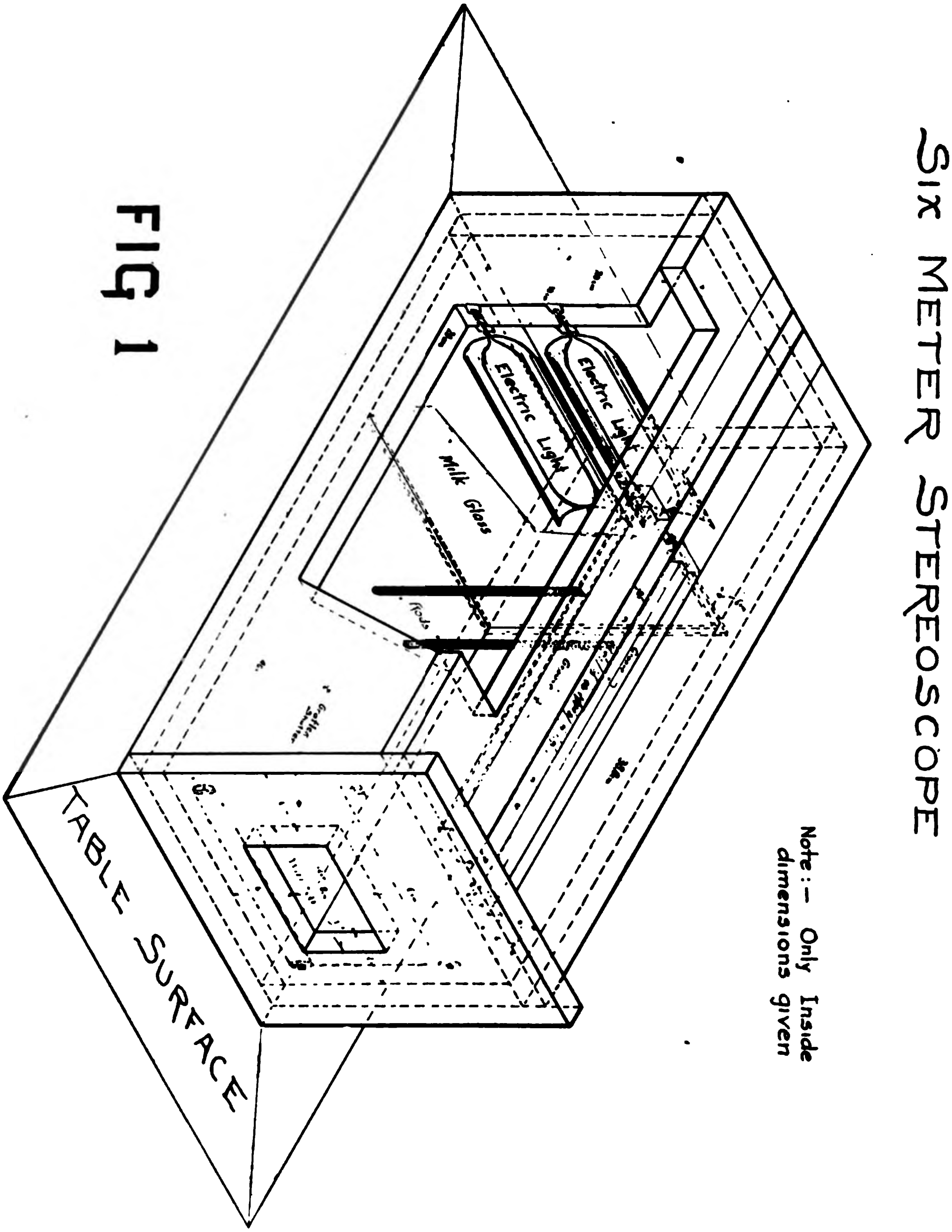
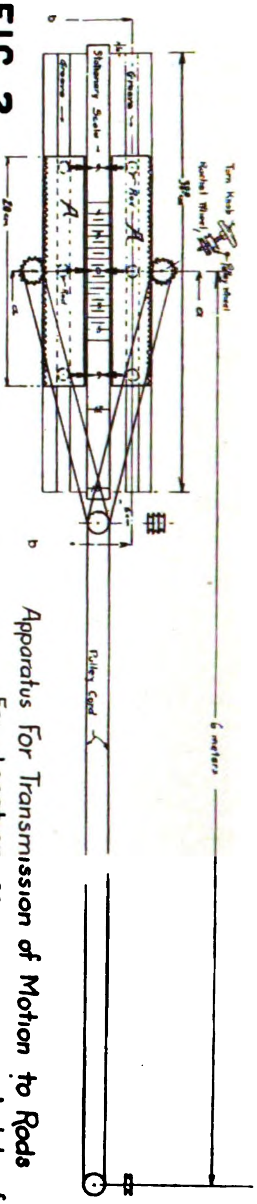


FIG 1

Fig. 1. For explanation see description on page 850.

FIG 2



Apparatus for Transmission of Motion to Rods
For Location see grooves in sketch of
SIX METER STEREOSCOPE

FIG 3

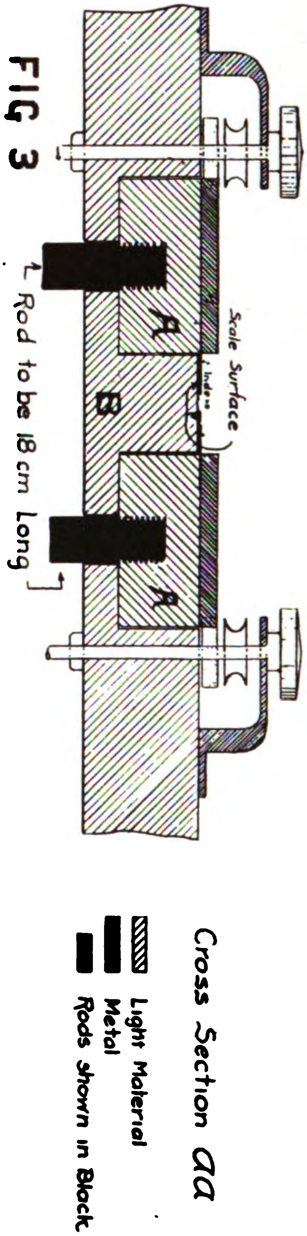
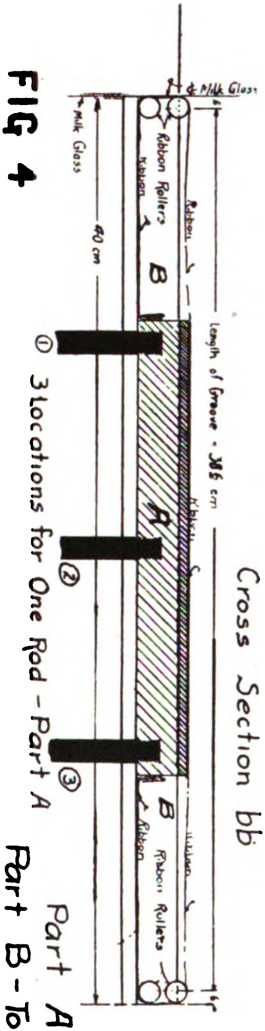


FIG 4



Part A - Slide
Part B - Top of Stereoscope
containing groove

Fig. 2, Fig. 3 and Fig. 4. See explanation pp. 850 to 853.

is used which has a test rod opposite it.

(b) Each one of the blocks is propelled by a rack and pinion located on the top of the box. To the shaft of each pinion is attached a pulley wheel and a turning knob (Figs. 2 and 3). Just behind the front elevation at the midpoint there is a coordinating triple wheel pulley. One wheel carries a cord from the pulley of the right rack and pinion shaft, the second wheel a cord from the pulley of the left rack and pinion shaft, and the third wheel a cord from a pulley wheel is attached to a table six meters away from the center of the compartment. Two holes in the front elevation are boxed to receive the cord from this pulley on the table.

(c) In order to prevent the emission of light thru the slits in the top of the box, ribbons about 2.5 cm. wide are attached to the sliding blocks and run over the wheels as indicated in Figure 4.

TWO METHODS OF EMPLOYING TEST.

(1) A subject sitting at the table with his head fixed in a head-rest may move the rods by simply manipulating the turning knob of the pulley wheel attached to the table in front of him. As a preliminary to each observation the examiner sets the rods at unequal distances from the subject's eyes. The shutter is then opened and the subject adjusts the rods into what he considers is the same reference plane, i. e., equidistant from his eyes. After a number of such trials the average error is recorded as his depth-difference threshold.

(2) In the second method the cards are removed. The examiner adjusts the rods and raises the shutter the same as before, but the subject is required to state which rod is nearer to him, the right or the left. The rods are first placed at a depth-difference of 30 mm. If the subject makes several judgments at this station correctly, the rods are placed successively at smaller intervals apart until the subject no longer is able to perceive a difference in distance. The shortest depth-difference at which he is able to judge correctly not less than 75 per cent of the trials is recorded as his depth-difference threshold.

PRINCIPLES AND FORMULAE INVOLVED.

For an understanding of the term "depth-difference" see Figs. V and VI. It will be observed that the greater the depth difference the greater will be the binocular parallax. Table 1 (see p. 662) is a computation of binocular parallactic angles based upon interpupillary distances ranging from 57 mm. to 72.5 mm., and upon depth-differences ranging from 5 mm. to 360 mm., when the near object is six meters distant.

IMMEDIATE CAPSULOTOMY IN THE EXTRACTION OF SENILE CATARACT

ARTHUR G. BENNETT, M. D., F.A.C.S.

BUFFALO.

This is an account of the author's technic and experience with a cataract operation that he believes is not so widely used as it should be. It was presented to the Section on Ophthalmology of the American Medical Association, June, 1919, and is here published thru the courtesy of the JOURNAL OF THE A.M.A.

No originality is claimed in this paper, but I venture to draw attention to an old procedure that possesses advantages and is not beyond the skill of the average operator.

Years ago I was told by friends who had visited the Paris Ophthalmic Clinics, of Dr. Trousseau, who performed the operation of extraction of senile cataract with one instrument. Using his fingers to steady the globe and also the lids, with the knife he opened the capsule as he passed thru the anterior chamber and expressed the lens with his fingers. While this *coup de maitre* is spectacular, it contains several elements of risk that are unnecessary and which the use of a few more instruments would eliminate. The one essential feature, the immediate capsulotomy during the passage of the knife across the anterior chamber, is, I believe, worthy of consideration.

Few practicing ophthalmologists in America, outside of the large centers of population, see a sufficient number of patients to belong to the class of experts qualified to do the "Smith-Indian" operation, since, according to the gentlemen who do perform it, nobody extracting less than 100 cataracts a year can possibly acquire that dexterity of manipulation or that delicacy of touch, without which success is impossible. Therefore to the vast majority of operating oculists this method is barred, and also to the greater number of patients is denied the luxury of a clear pupil, even tho it be a dragged up and distorted one. Dr. Bulson, in discussion before this section, some years ago stated that the average operating oculists performed about twenty-five extractions per annum. This I believe to be the truth, perhaps an overestimate rather than an underestimate. Outside of the large cities of New York, Chicago, Philadelphia, Boston, and possibly towns like Dayton, Ohio, where a large number of elderly people are congregated, few of us have the opportunity to see more than two or three cataracts a month.

In a fairly large practice this is about my average; therefore I have despaired of ever acquiring the skill to perform the Smith-Indian operation and have renounced all thought of ever attempting it. Recently, however, I have been tempted to depart from the classic capsultomy, not opening the capsule with the forceps or the capsulotome, but using the point of the knife in its passage across the anterior chamber. I have been so much pleased with the result that I venture to urge the procedure on the respectful attention of my colleagues who are in my class, and have not reached the minimum annual extractions to qualify them to enter the class of experts who so ably remove the lens in its capsule.

I have performed this operation twenty-six times during the last fourteen months and believe the advantages to be the following:

1. Only one instrument is introduced into the anterior chamber, thus minimizing the chances of infection.
2. The lens is supported by the aqueous humor so that there is less danger of rupturing the suspensory ligament and thereby losing vitreous. In twenty-six cases only twice have I lost any vitreous at all, and then only a small quantity.
3. The clean-cut opening in the center of the capsule gapes open, leaving

a clear center; and unless the posterior capsule is opaque, no secondary needling is necessary.

AUTHOR'S TECHNIC.

There is a certain technic to be followed in doing an immediate capsulotomy, and the method to be described has been found the most advantageous:

In the preparation of the patient the pupil should be thoroly paralyzed, not merely dilated, to permit of as large an incision being made in the capsule as possible, and further, the pupil should be so wide as to permit the lens to escape without being squeezed by the contracting fibers of the iris, and cortex retained. This point is an important one from another standpoint. I believe that a dilated (paralyzed) iris is much less liable to prolapse than a contracted one, and also that an unbruised iris is less prone to develop iritis. A dilated iris is, of course, thicker than a contracted one; and during the period that elapses until the wound is healed, while the aqueous is still escaping, there is much less danger of prolapse taking place. I do not subscribe to the doctrine that physostigmin (eserin) should be used after a simple operation to prevent prolapse, because I believe that it really encourages it, producing, as it does, a greater surface for the escaping aqueous to push against. In consequence of this conviction, therefore, I have atropin sulphat, 1 per cent, instilled in the patient's eye twice, two hours before operation. This is usually sufficient to paralyze completely the iris as shown at the time of operation by the pupil's remaining dilated after the lens has been extracted. Of course, the usual preoperation preparation of sterilization now practiced by all of us is carried out, and the cleansing of the eye by a boric acid douche when the patient is on the operating table.

One very necessary part of the correct performance of any cataract extraction is perfect local anethesia, and this is best secured by the subconjunctival injection of cocain and epinephrin administered after the instillation of cocain until the conjunctiva is insensitive. I have never seen any harm come from this injection, and it certainly prevents sudden jerks by a nervous patient, that do occur if there is even a suggestion of pain.

In making the incision I take nearly one-half of the cornea, and immediately the knife has passed the edge of the pupil, the point is depressed and the capsule entered; the point should not be carried in deeply, only just under the capsule, and made to emerge just at the opposite edge of the pupil. Then it is carried over to the other side of the cornea, the counter puncture is made, and the section is completed with a conjunctival flap. The conjunctival flap gives me a sense of security that I do not have if I make a purely corneal incision.

The speculum is now removed and the patient instructed to look down. Then, with one thumb on the upper lid and the other on the lower, the lens is gently expressed. I have been astonished to find how much more cleanly one can express the lens with one's fingers than by the intervention of spoons and spatulas. The contour of the lower lid, fitting as it does the curve of the cornea, seems to make a more even pressure on the whole surface of the lens, and expresses it in a more compact mass than the Daviel spoon. Rarely have I seen any cortex remain, even in immature cataracts. It has not been necessary to wash out a single anterior chamber in any of my cases, and with the classic capsulotomy this was a frequent procedure and an added danger.

After the lens has been extracted, inspection of the eye is made to see if any cortex is remaining and if the iris is in place; frequently nothing more remains to be done save to apply the dressings. Occasionally the iris may not have returned to its proper position; then a few strokes of the spatula will release it from its entanglements, and the pupil will assume the normal round shape. atropin, 1 per cent, is then instilled, White's mercuric chlorid ointment[1] is inserted between the lids, and both eyes are bandaged for forty-eight hours.

ADVANTAGES OF THIS OPERATION.

1. As no iridectomy is performed, a round pupil results.
2. A minimum of instruments are introduced into the eye, thereby lessening the danger of sepsis.
3. The gaping of the lens capsule, leaving a clear center, obviates the necessity of a secondary needling in the majority of cases.
4. The very short time that the speculum is used lessens the danger of loss of vitreous.
5. The ease with which the operation is performed. Any operator who can make a decent section can open the capsule more readily with the knife point than he can with either the capsulotome or the capsule forceps.
6. The lens can be more readily and more cleanly expressed with the fingers than with any instrument.

OBJECTIONS TO THIS OPERATION.

1. The anterior chamber is shallow. There is danger of the iris falling over the knife while the section is being made. This, of course, applies equally to any form of cataract extraction, and can be met by a preliminary iridectomy. However, if a round pupil is desired it can be obtained by a method described by Brudenell Carter many years ago, which I have used several times, with two keratomes. The cornea is opened simultaneously on opposite sides just above the usual point of puncture and counterpuncture, and the wounds are made so that the upper portion of each approach each other toward the summit of the cornea; one of the instruments may be made to enter the lens capsule, thereby making the capsulotomy. On the withdrawal of the keratomes there will be left a bridge of corneal tissue which can be divided with a blunt pointed cataract knife which can be made to glide between the iris and the posterior surface of the cornea, without wounding either. This is a very satisfactory method when the anterior chamber is so shallow that difficulty is anticipated.
2. The fingers or the thumbs are used to express the lens. The late Dr. Beard was very severe in his condemnation of the procedure, urging the danger of expressing bacteria from the meibomian follicles. The objection is, however, more theoretic than real. The force used is so slight, the gentlest pressure being sufficient to express the lens and totally inadequate to force out the contents of the meibomian follicles, that I have never seen any infection follow the use of the fingers and do not expect to. The use of an antiseptic dressing for some hours before operation also reduces this danger to a minimum.
3. There is danger of prolapse of the iris. Since I have insisted on the use of atropin until the absolute paralysis of the iris is obtained, I do not fear this danger, particularly if a conjunctival flap is made on completing the section. This closing of the wound in a few hours prevents sudden gushes of aqueous, which tend to carry the iris into the wound, particularly if the iris is not paralyzed, and more so if contracted by physostigmin.
4. Dislocation of the lens, with subsequent loss of vitreous, conceivably might occur if the capsulotomy were made too deeply; but if the capsule itself is cut and the lens merely touched, it is not liable to happen. The lens is well supported and held in position by the unescaped aqueous and, unless the knife is clumsily wielded, should not be dislocated. Still this has happened once with me in an overripe lens with an unruly patient, and the result obtained was a Smith-Indian pupil, as the lens escaped in its capsule. However, as the speculum was out of the eye but little vitreous was lost and a very good result was obtained. Unfortunately, however, this patient ultimately lost his vision from a severe retinal hemorrhage one month after operation. He was a man of 77 with hard arteries, and

---

[1] The ointment is composed of 1:3,000 mercuric chlorid in petrolatum.

there is a legitimate doubt as to whether the operation was in any way responsible for his loss of sight. We have all seen retinal hemorrhage occur in cases of arteriosclerosis without any operation. However, I did learn a lesson from the case. I should not attempt an immediate capsulotomy in an overripe lens for two reasons:

(a) The weakened attachment of the suspensory ligament is liable to cause it to rupture easily and induce loss of vitreous.

(b) The capsule, which is generally thickened, does not divide easily, as it does in a lens that is not hypermature.

I therefore deprecate this method in such cases, preferring to open the capsule with the forceps and extract after an iridectomy to obviate the distorted pupil, which is so commonly the result when the lens escapes in the capsule. As to the ultimate results, the accompanying table compares favorably with others that I have seen published, and altho the number is small, may encourage my colleagues in my class to give this method a trial.

RESULTS OF OPERATIONS.

No.	Date	Initial	Sex	Age	Eye	Refraction	Vision	Remarks
1	12/ 2/17	C. V.	F	73	R	+10.00 sph.	20/20	
2	2/12/18	E. M.	F	80	L	Myopic	No central vision	Central choroiditis
3	2/ 7/18	P. C.	M	72	R	+10.00 sph. ⌢ +2.00 cyl. ax. 15	20/50	Iris fell over knife, and excised piece fell to bottom of anterior chamber.
4	5/27/18	F. L. P.	M	70	R	+ 8.50 sph. ⌢ +3.00 cyl. ax. 15	20/100	Report eye injured 50 years ago and has been blind with this ever since.
5	6/20/18				L	+12.00 sph. ⌢ +1.00 cyl. ax. 180	20/30	
6	5/27/13	J. O.	M	66	L	+ 9.00 sph. ⌢ +3.00 cyl. ax. 165	20/25	
7	11/22/18				R			
8	6/19/18	L. A.	M	66	R	Not refracted	—	A secondary needling necessary.
9	7/11/18	W. S. M.	F	60	R	+ 9.50 sph. ⌢ +2.50 cyl. ax. 180	20/30	
10	6/18/18	R. J.	M	70	R	+11.50 sph. ⌢ +2.00 cyl. ax. 180	20/50	Lens immature
						+10.00 sph.	20/20	Acknowledges "a touch of syphilis"; paralysis agitans
11	6/12/18	L. J. S.	M	71	R	Dense capsule given +10.00 sph.	.....	Right capsule should be needled, but patient is satisfied with present vision
12					L	+ 9.00 sph. ⌢ +2.50 cyl. ax. 180	20/30	
13	6/26/18	F. B.	M	72	R	+ 6.50 sph. ⌢,+3.50 cyl. ax. 165	20/40	A practicing dentist; has resumed professional work
14					L	+ 7.50 sph. ⌢ +2.50 cyl. ax. 20.	20/40	
15	9/18/18	C. F.	M	84	L	+ 7.00 sph. ⌢ +3.00 cyl. ax. 15.	20/50	
16	9/25/18	A. P.	F	64	R	Not refracted nearing +10.00...	.....	Right eye operated on later with small prolapse of iris; is satisfied with +10.00.
17					L	+ 9.50 sph. ⌢ +2.25 cyl. ax. 15.	20/40+	
18	11/ 5/18	J. S.	F	57	R	+ 7.50 sph. ⌢ +5.00 cyl. ax. 165	20/40	Iris caught on knife in making section
19	11/16/18	J. F.	M	77	L	Loss of vitreous................	%	Retinal hemorrhage 1 month after operation.
20	11/21/18	F. S.	F	63	R	+10.00 sph. ⌢ +2.00 cyl. ax. 175	20/30	Patient had chronic glaucoma of both eyes; I trephined both eyes 12/14/17; both lenses became opaque
21	1/18/18	H. H.	M	69	R	Not yet refracted...............	.....	Right lens, hypermature capsule tough; slight loss of vitreous; left, no loss of vitreous
22	3/14/19				L			
23	1/19/19	J. S.	M	67	L	+11.50 sph. ⌢ +1.75 cyl. ax. 15.	20/40	
24	6/ 4/18	W. S.	F	61	R	+ 8.50 sph. ⌢ +4.00 cyl. ax. 180	20/40	
25	11/24/18				L	+10.50 sph. ⌢ +2.00 cyl. ax. 15.	20/30	A case of ozena with dacryocystitis; both canaliculi destroyed with dichloracetic acid; healing uneventful
26	2/12/19	S. G.	F	60	R	Not yet refracted..............	.....	

COMMENT.

An analysis of the twenty-six cases shows: Two eyes, 20/20 vision; one eye, 20/25 vision; five eyes, 20/30 vision; six eyes, 20/40 vision; three eyes, 20/50 vision; one eye, 25/100 vision; six eyes not refracted; three too early; two should be needled; one satisfied with +10.00 sph.; one eye, no vision because of central choroiditis; one eye, no vision from retinal hemorrhage.

Seventeen of the patients obtained 20/50 or better. The patient with 20/100 had been blind in this eye for fifty years from accident, and any vision was better than what he had for so long.

I was very much disappointed in Case 2, as it was ideal from an operative standpoint. The patient's projection before operation seemed perfect. However, when she came for refraction an old central choroiditis was discovered and the vision was eccentric.

I have referred to Case 19 earlier in the paper.

I wish briefly to call attention to Case 20: This woman had chronic glaucoma of each eye with tension of 56 mm. and a rapidly deteriorating vision. The lenses were slightly opaque. I trephined both eyes December 14, 1917, and stayed the glaucomatous process. However, the lenses continued to become more and more opaque, and, November 21, 1918, I removed the right one. In making the trephine operation I buttonholed the iris, leaving a round pupil. At the cataract operation the lens was removed through the intact pupil. The resulting vision is 20/30.

Patient 9 was a man of 70 who acknowledged specific infection; he was also a sufferer from paralysis agitans. At the time of operation my assistant was obliged to hold his head steady the entire time, and altho it was possible to control this, his lower jaw persisted in its agitation, and I can assure you that it is disconcerting to have a patient gnash his teeth at you all the time you are performing a delicate operation. However, the outcome was very successful. Vision is 20/20 with a +10.00 sph. with a perfectly mobile pupil.

Of the six cases on which I cannot yet give the ultimate vision, three were too recent to be refracted at the time this paper was written. Two should be needled because of opaque posterior capsule, and the remaining one is satisfied with a +10.00 sph., which was given to balance the weight of the lens prescribed for the first operated eye. All these six eyes promised to give an average result, when finally fitted, at least equal to those reported.

Finally, I wish to urge my confrères that are in my class to give this method a trial, and I can assure them that they will not be disappointed.

PARALYSIS OF ACCOMMODATION DUE TO FOCAL INFECTIONS.

CLARENCE A. VEASEY, M.D.,

SPOKANE, WASHINGTON.

This report of three additional cases was read at the meeting of the American Ophthalmological Society, June 17, 1919. (See discussion p. 879.)

At the meeting of the Pacific Coast Oto-Ophthalmological Society in June, 1916, I presented a paper on "Chronic Infections of the Faucial Tonsils as a Causative Factor in the Production of Paralysis of the Accommodation with the Report of Two Cases."

One of these cases was treated for some time for the paralysis of accommodation without result, and within four days after the removal of the infected tonsils, the patient was able to read Jaeger 3, and within six days from the time of the operation the accommodation was entirely restored.

The second case was given no treatment for the ophthalmoplegia and within three days after the removal of his infected tonsils the accommodation was entirely restored.

In the same paper another case of paralysis of accommodation due to a focal infection is referred to as having occurred in the practice of Dr. T. B. Holloway, of Philadelphia, who was kind enough to give me the notes, the latter case being due to a streptococcic catgut infection.

Since the above report was presented, a number of other similar reports have appeared in the literature, not only from chronic infection of the faucial tonsils, but from focal infection occurring elsewhere, and I wish now to present briefly a report of three additional cases.

Case 1. Miss Blank, aged twenty-one, known by the writer all her life, while on shipboard returning from a three months' sojourn in the Hawaiian Islands, complained of difficulty in reading fine print. But little attention was paid to the complaint at the time and the condition gradually progressed.

The patient's general health was excellent. There had never been any trouble with the eyes before. She had a very moderate astigmatism, using in R. + cyl. 0.25 D. axis 90°, and in L. + cyl. 0.37 D. axis 90°. The vision of each eye at the time of refraction two years before was 6/5+, both with and without lenses.

After reaching home the patient's eyes were examined and she was found to have 6/5 vision in each eye, both with and without glasses, and there was found to be an almost complete paralysis of accommodation. The eye grounds were normal.

About nine months before the patient had had an infection of the right antrum which cleared up under a few irrigations. Examination at the time of studying the eyes showed no infection of the accessory nasal sinuses, no pus in the nares, and no pus could be expressed from either of the faucial tonsils. A skiagraph of the teeth showed slight absorption at the root of one of the central incisors, a tooth which had been filled, but the filling did not extend to the bottom of the pulp cavity. This tooth was opened and drained and within two weeks the accommodation had entirely returned.

Case 2. Miss B. M., aged about thirty, a graduate nurse holding a responsible position in a large hospital, first observed forty-eight hours before being seen by me that she could not read ordinary print with the right eye. At the time of the examination the vision was, R. 6/30, and L. 6/6. In the right eye the pupil was widely dilated and immobile. There was complete paralysis of accommodation. No gross fundus changes were visible.

In the left eye the pupil was 4 mm. in diameter, normal in reaction, and she could read Jaeger 1; p.p. 7″.

An examination of the nasal accessory sinuses was negative. All of them transilluminated well, and there was no free pus in the nose. Large quantities of pus could be expressed from each faucial tonsil, the latter being cryptic in character. The blood, Wassermann and urine were negative. The patient stated that she had formerly had an attack of appendicitis, the appendix not having been removed, but an examination by her surgeon resulted in the report that there was no trouble at the present time and it was not believed that any focal infection could have arisen from this portion of the body. An examination of the teeth also was negative.

With the belief that the chronic infected tonsils might possibly be the cause of the paralysis of accommodation, they were removed under local anesthesia. Three days later the accommodation was returning, the pupil was much smaller, and the patient could read large print on a magazine cover. Inasmuch as she was in bed at the hospital, no actual measurements of the accommodation were made at this time. Five days after the operation the patient read easily Jaeger 6. One week after the operation the accommodation had entirely returned and Jaeger 1 was easily read, both pupils being equal in size and normal in reaction.

Case 3. E. B. T., female, married, aged about 26 years, was first seen January 31, 1919. She presented a history of great difficulty in reading from time to time, altho, according to her statement, her distant vision was fairly good. There was also a history of hemicrania and some complaint of gastrointestinal disturbance.

The vision for the right eye equalled 6/6, and the patient at the time of the examination read with great difficulty Jaeger 1, p.p. 14 inches. The vision of the left eye was 6/7.5, and the patient read Jaeger 3, p.p. 15 inches, with great difficulty.

Examination of the nose and throat showed marked deflection of the nasal septum, but no pressure was present and no free pus in either naris; there were chronically diseased tonsils and a large, ragged adenoid filled with crypts.

Further tests showed that the patient had an impaired accommodation, and the immediate removal of the tonsils and adenoids was advised. It was not believed by the patient, however, or the patient's husband that the tonsils and adenoids could have anything whatever to do with the ocular condition, and the removal of the tonsils and adenoids was therefore postponed until some months later, the eyes continuing in the same condition in the meantime. Within two weeks after the removal of the tonsils and adenoids, the patient was again examined, and the vision for R. was 6/6, the patient reading easily Jaeger 1, p.p. 9 inches, and for L. 6/5, reading Jaeger 1 easily, p.p. 7 inches. The general health was also very greatly improved.

This last case was not, at the time that she first came under observation, one of complete paralysis of accommodation, but one of paresis. It is understood that at times the accommodation had been completely paralyzed, and the fact that the condition cleared up so rapidly after the removal of the tonsils seems to place it in the same class with the other two cases.

It is believed that in each instance the paralysis or paresis of accommodation was due to a focal infection, in the first case the absorption at the root of the central incisor giving rise to the focus, and in the second and third cases the focus being found in the chronically diseased tonsils.

ACCOMMODATION IN THE LENSLESS EYE.

A. Edward Davis, A.M., M.D.,

NEW YORK CITY.

This discussion of apparent accommodation after removal of the lens is based upon the case of a woman, aged 73, who had been subjected to cataract extraction. Read before the American Ophthalmological Society, June 17, 1919. (See p. 881.)

In 1895[1] the author reported two cases of accommodation in the lenseless eye, one in a young subject, the other in a man 42 years of age, both following extraction of cataract, together with a review of the literature on the subject up to that date, 1895.

Having observed another even more remarkable case of the same nature, occurring in a woman 73 years of age, I have thought it worth while to report the case before this scientific body, and to have an expression of opinion on the question, to wit, *whether the lenseless eye has accommodative power.*

Förster, Woinow, von Graefe, Silex, Jaeger, Loring, the author, and many others maintain that accommodative power, in exceptional cases, is present in the lenseless eye; while such eminent authorities as Helmholtz, Donders, Manhardt, etc., oppose this contention, Donders[2] declaring that his investigations had convinced him, "that in aphakia not the slightest trace of accommodative power remains"; and further, "In old people, and with imperfect acuteness of vision, observers sometimes think they are able to prove the existence of a certain amount of range of accommodation; but in young persons, with perfectly clear pupils and great acuteness of vision, in whom precisely we might still expect to find some accommodative power, it is quite evident that the latter is entirely lost."

Donders then reports two cases in young people in whom the lens had been removed by discission, with excellent result, the vision being extraordinarily acute in one case, in which no trace of accommodative power could be demonstrated. His method of testing the accommodative power was the familiar one of looking at a point of light in the distance with the refractive error properly corrected. "With glasses of 1/3, placed at 5″ from the eye, he saw, at a great distance, a point of light sufficiently round and perfectly defined. A sight (*vizier*) was placed in the direction between one of the eyes and the point of light, and when he looked with converging visual lines towards the sight, the point of light remained unchanged or became somewhat smaller and sharper, without changing its form. If the lens was removed only ¼″ more or less from the eye, the distant point of light had ceased to be a defined, round point, and was elongated in one direction, to the form of a line; now even with the most powerful exertion, and convergence in the point of sight, the line of light became only somewhat shorter, without, however, a point making its appearance. This shortening, as well as diminution of the acutely seen point, depended upon narrowing of the pupil, which was, indeed, directly observed[2]."

In a second case, a similar test was made with a like result, and an additional test was made, to wit: While the patient was looking at the point of light with his correction on, Donders interposed a weak plus (1/180) or minus glass (1/180) in front of the eye, which produced the well-known change in the point of light; the patient constantly stated that "by + 1/180 (.25D) the point of light was extended in the vertical, by — 1/180 (.25D) in the horizontal direction to a short line. On the other hand the convergence of the visual lines, with the effort to see near objects, was not followed by the slightest change of form, consequently, there was no reason to suppose the existence of accommodative power[2]. The same experiment was repeated with a lens of only 1/300 (about .12D) with similar results, consequently, Donders concluded that not a trace of accommodative power was left in the lenseless eye, even in young subjects.

Donders did not give the result of his tests with Snellen or Jaeger types, but used only a point of light.

I have given both of Donders' tests rather fully, in order to show the error made in the first; and the unreliability of the second. In the first he states that he moved the correcting glass 1/3 (or +12D) slightly (¼″) *from* the eye, then had the patient make accommodative efforts to correct the blurred image which had been brought about by moving the glass *forward*. I submit that the correcting glass should have been moved *toward* the eye (backward) if the accommodative effort was to be tested. In regard to the second test of interposing a very weak glass (plus or minus) in front of the correcting glass, and noting if the image is elongated in the vertical meridian by a plus glass, or in the horizontal meridian by a minus glass, is often most contradictory and unsatisfactory. In other words, I do not think Donders made sufficient tests to prove his contention,—that no trace of accommodative power remains in the lensless eye.

It is interesting to cite here the case reported by Loring, of an exactly similar type to the two reported by Donders, in which Loring arrives at diametrically opposite conclusions to those of Donders. The patient was a young girl, aged 18 years, in whom both lenses had been removed by discission: "The pupils were round, free from membrane and active. With +1/3½, the patient read with either eye fluently Snellen XXX, and was able, with both eyes, to pick out most of the letters of XX at twenty feet. She could read No. X at ten feet, and No. V. at five feet. With the same glass, and with no change of position on the nose, she read No. 1½ Snellen fluently, holding the book naturally at twelve inches, which was about the same distance at which she usually read. The book was then gradually withdrawn, the patient reading aloud while this was done. It was found that twenty-one and a half inches was the greatest distance at which No. 1½ Snellen could be read. She read No. 1 Jaeger at twenty inches. The book was then advanced inch by inch, the patient reading aloud till the book was within five inches of the eye. Inside of this, reading was impossible. These experiments were tried over and over again by myself, and were finally repeated in the presence of a brother oculist. This would give the patient an adaptability of the eyes for different distances from twenty feet (or parallel rays) to five inches; or, in other words, an accommodation of 1/5 (A = 1/5) and a relative accommodation for the very finest print from twenty inches to five (A = 1/6½)."

One could not ask for more convincing proof of accommodation in the lenseless eye, than the report of the above case of Loring. However, one of the cases formerly reported by myself, already referred to, is just as convincing[1]. Very briefly stated, the salient points in the case are: The patient, a man 42 years of age, had combined extraction of a black cataract in the right eye, January 17, 1894. Three months after the extraction V = 20/10 with + 11.50 D, and with the same glass, which he did not move on his nose, he read Jaeger No. 1 from 14" to 18". On February 4, 1895, the patient maintained his marked acuteness of 20/10 with + 11.50 D, and read Jaeger No. 1 from 8" to 22½". The shape of the pupil in this case was an irregular vertical oval from the iridectomy, and free from membrane, except a very narrow margin at the edge. The transverse diameter was 3½ mm., the vertical about 7 mm. This patient was presented before the New York Ophthalmological Society in October, 1894, but the members were divided in their opinions as to how the patient was able to accommodate for the near point.

REPORT OF PRESENT CASE.

Mrs. J. H. B., aged 73 years, in fairly good health, consulted me, January 18, 1919. Senile cataract in each eye, mature in the left; R. V., fingers 4 feet; L. V., L. P. projection, good.

February 7, under cocain anesthesia, a combined extraction was performed on the left eye. There was an uninterrupted recovery, and the patient was discharged from the hospital on the seventh day. March 22, six weeks after the operation, she was tested for glasses with the following result: Ophthalmometer—Astigmatism against the rule, 2.50D. L.V. = 15/30 with + 16D⊃ +1.50 cyl. ax. 150°. The patient reads Jaeger No. 1, 7" to 13" with the same glass without changing position or tilting the same. By preference, she holds ordinary newspaper print at 8 inches. The ophthalmoscope shows H. 16 D and the media clear. The pupil is closed by a membrane, except for a clear space at the center, vertically oval in shape, 2½ by 3 mm. in diameter.

The patient, when she came under my care, was wearing R. eye +6D⊃ +2C ax. 60°, L. eye +6D⊃ +2C. ax. 135°. She gave a history of having strabismus in childhood, which "was cured by having the ears pierced*."

It is significant that the patient later in childhood wore strong convex glasses which likely accounts for the cure of the squint without operation.

Extensive and rigid tests were made in the two former cases reported by me, and the same were repeated in the present case. Subjective tests: 1. (a) Acuteness of vision for distance and near point, with the distance glasses; (b) same with upper lid held up; (c) same with a few drops of cocain instilled and speculum to hold lids open; (d) adding weak plus or minus glasses to distant glasses and noting changes in acuteness of vision; (e) to repeat the above tests with the opposing eye uncovered, and with the visual lines converging. 2. Testing the acuteness of vision for a distant point of light (after Donders' methods), under the five conditions imposed in test No. 1.

---

*Dr. A. E. Davis, New York City.

Dear Dr. Davis:—In answer to your letter of the 5th inst. regarding Mrs. J. H. B., I find that I examined her eyes on March 27, 1915. At that time her vision was:

O. D. 20/100 w + 6.00 D. Sph. + 2.00 D. Cy. ax 60.

O. S. 20/100 w + 6.00 D. Sph. + 2.00 D. Cy. ax 135.

The centers of both lens were sclerosed. Another peculiarity about this case is that when a child she had squint which was cured by piercing her ears.

With kind regards, I am,

Yours truly,
T. H. FARRELL.

Objective tests: 1. (a) Measurement, with the ophthalmometer, of the radius of curvature of the two chief meridians of the cornea at the point where the visual line intersects same; (b) same measurement five degrees to the temporal side of this point, which is close to the apex of the cornea, as the angle alpha is usually positive, and about five degrees in amount. 2. (a) With the Placido disc removed from the cylinder of the ophthalmometer, and with the patient looking five degrees to the inner or nasal side, to note if any changes are made in the relative position and size of the corneal images when the eye changes from looking in the distance to a near point, *the eye not changing its direction;* (b) the same test with the lids held open with a speculum; (c) with the opposite eye uncovered both of the above tests repeated. 3. Ophthalmoscopic measurements of the fundus were made, to see if any change in depth occurred when the eye changed from a state of rest to accommodative efforts. 4. The size and shape of the pupil, if clear, or partially filled with membrane, activity, etc., noted. All of the above tests were carefully made in the present case, with the visual results noted in the case report, that is, vision 15/30 w+16D$\overset{\frown}{\smile}$ +1.50 cyl. ax. 150°; and with the same glass, without being moved or tilted in any way, she read with ease, and as a matter of choice, Jaeger type (No. 1) at 7". And after atropin had been instilled three times a day for three days, Jaeger No. 1 could still be read from 8" to 13", the near point having receded from the eye one inch, under the influence of the cycloplegic*. This would indicate that, in this patient at least, the ciliary muscle had some influence on the accommodation, even after the lens was removed; for without atropin in the eye, the patient could read Jaeger No. 1 at 7", while with atropin in the eye, the Jaeger No. 1 could not be read closer than 8". Now the difference between a lens of 7" focus (5.71 D) and one of 8" focus (5. D) is .71D; that is, the ciliary muscle exercised accommodative effort of .71D, about three-fourths of a diopter. (When the right eye was covered in these tests, it was seen to turn in, and the pupil to contract for the near point.)

Donders' test with a point of light in the distance, where weak plus or minus glasses were interposed in front of the correcting glass, proved unsatisfactory, as the patient made contradictory statements.

As to the objective tests in this case, the ophthalmometer showed an astigmatism of 2.50D against the rule, the lesser refracting meridian being at 60° (40.50 D), while the stronger refracting meridian was at 150° (44.D) in refractive power.

When the patient made accommodative effort on looking into the tube of the instrument (the images of the mires having been approximated just so they touched before the effort was made) the images would overlap about .75D in the meridian of 150° and became slightly blurred, and the instrument had to be pulled slightly away from the patient to get a clear image. But little or no change took place when this experiment was tried with the meridian at 60°.

It was impossible to detect any change in the depth of the fundus of the eye with the ophthalmoscope when the eye changes from a state of rest while looking in the distance and when making accommodative effort. However, that the curve of the cornea can be changed, by accommodative effort, to a slight extent at least, in the lenseless eye, is shown by two of my cases. In the normal eye the change in curvature of the cornea by accommodative effort is in some cases very marked. The most marked case of this kind that I have seen occurred in the person of Dr. C. H. Johnson, a former house-surgeon at the Manhattan Eye and Ear Hospital. The ophthalmometer showed him to have ordinarily an astigmatism .50D. ax. 90° + 180°—each eye. He could, however, without in any way changing the direction of the eye, voluntarily, by efforts at accommodation, change this astigmatism in the right eye to 2D., and in the left to 1.50D. He was able to do this while the upper lid was held up with the finger, showing that it was not due to lid-pressure. He did this many times, and the same change was observed by a number of the staff at the hospital. Desiring to know if this change was due to the action of the ciliary muscle or to that of the external muscles of the eye, I wrote to the late Dr. J. M. Ray, of Louisville, where Dr. Johnson resided, to put Dr. Johnson's eyes under the influence of a cycloplegic (the doctor permitting), and in that way eliminate the question of the ciliary muscle. I give his report:

---

*These tests were repeated in the presence of a fellow oculist, Dr. F. W. Shine.

"V. R. E. 20/20; V. L. E. 20/20. Ophthalmometer shows astigmatism with the rule, .50D ax. 70° 160° Rt.; 90° + 180°—Lt. When he made an effort at accommodation without changing the direction of his eye, the astigmatism can be seen to go up to 2D in R. and 1.50D in L. Scopolamin, four instillations of 1/5% solution, apparently paralyzed accommodation. Then with the ophthalmometer the astigmatism still seems to increase in the right eye to 1.50D, and in the left to 1.D."

From this it appears that, in Dr. Johnson's case at least, the change in the curve of the cornea was brought about mainly by the external muscles of the eye, as the influence of the lids and ciliary muscle was eliminated.

My own conclusion, from studying the history of the subject, and from the careful and complete tests made in the three cases reported by me, is that the accommodation present in the lenseless eye is due chiefly to the ability of the patient, in such cases, to interpret dispersion circles. The slight change in curvature of the cornea, and its slight advancement observed in some cases, may, in those cases, account for some of the accommodative power present, but it is such a small factor that it may be eliminated entirely, especially since in some of the most marked cases of accommodation in aphakic eyes no such changes have been observed. How the change in the curvature of the cornea and its advancement are brought about have been discussed in this paper already.

Altho, as Loring says, "It would seem impossible that the ability to read the finest print at five inches (which was done in his case), even taking into consideration the magnifying power of the glass, could be due to the overcoming of the circles of dispersion," yet I believe such to be the case, and for the following reasons: First, to the great increase in size of the retinal images by the removal of the crystalline lens and replacing it with a lens in front of the eye. By this procedure the united nodal point is moved forward, and this, with the magnifying power of the glass in front of the eye, greatly increases in size the retinal images. Donders[2] has shown by calculation, that a convex lens of three-inch focus, placed one-half inch (usual distance) in front of the eye increases the retinal images in size one and one-third times. By this one factor alone, then, the images of Jaeger No. 1 would be increased in size until they equaled (for the unoperated eye) Jaeger No. 2, or a little larger. Second, to the narrowing of the pupil. Where no iridectomy is done, this is due to contraction of the iris as the result of convergence and an effort at accommodation; where an iridectomy is done to a partial filling up of the pupil by membrane, except the central opening. It is a well-known fact that if the pupil is narrowed from any cause such narrowing acts as a diaphragm to cut off the peripheral rays of light entering the eye, and serves in this way to lessen the dispersion circles. Third, to the extraordinary acuteness of vision present sometimes after cataract extraction, e. g., as happened in one of my cases, where it was 20/10, double the ordinary acuteness of vision. I believe this fact contributed largely to the power of interpretation present in this case; for he had an iridectomy and a clear pupil. Fourth, in some cases, to the patient not looking directly thru the center of the glass, but slightly outside of the center, either by tilting the glasses, tilting his head, or not holding the reading matter directly in front of him. In my opinion, this fourth factor in effect, a slight tilting of the strong plus glasses, assists the individual in interpreting dispersion circles chiefly by neutralizing the monochromatic aberration present in such cases. This is a point which no writer has hitherto called attention to in discussing this subject. Wm. Harkness[3] has shown that, "with a pupil four millimetres in diameter, the normal cornea produces monochromatic aberration to the extent of 1/33; and as there is no confusion of images in the normal eye, it seems probable that the crystalline lens exerts some compensating action. This suspicion is strengthened by the well-known fact that in aphakia the acuteness of vision is nearly always improved by giving a certain inclination to the powerful convex glasses which are then necessary[3]." Furthermore, this very fact of monochromatic aberration in the lenseless eye, to my mind, renders Donders' light-point test more or less unreliable.

REFERENCES.

1. Manhattan Eye and Ear Hospital Reports, Jan., 1895.
2. Donders: Accommodation and Refraction of the Eye, p. 318, 320, 321.
3. Harkness, W. Archives of Ophthalmology, v. 12, p. 18.

NOTES, CASES AND INSTRUMENTS

ASSISTANTS IN SMITH'S CATARACT OPERATION.

Major A. E. J. Lister, M.B., B.S., London, F.R.C.S., England. I.M.S.
LUCKNOW, INDIA.

It is, I think, urged with justice that one of the drawbacks to Smith's operation for the intracapsular extraction of cataract is that it requires a very highly trained and experienced assistant for its safe performance. I agree fully with this opinion, as the result of my own experience. Some three and a half years ago my house surgeon fell ill in the height of the cataract season. I was, therefore, forced to devise a method of using less skilled men, as I had no time to train another man.

From practical experience in assisting at Smith's operation I knew the only real difficulty was to control the orbicularis muscle with the third and fourth fingers, while at the same time with the thumb and first finger holding up the lid with the strabismus hook. It is quite a simple matter to do either of these duties separately, the difficulty lies in doing them at the same time.

I therefore determined to use two men, one for each of these duties. I had available two men called compounders, who in India dispense medicine and help in dressing cases.

I made one control the orbicularis muscle with his thumb; for the right eye the thumb of the assistant's left hand is used, his arm being extended at full length, so as to remove his body out of the way of the operator. For the left eye the right thumb is used in a similar manner.

The other assistant finds it very easy to hold up the upper lid with the right hand and with the left hand to slightly pull down the lower lid. As the eyelids and eyebrow are wet the thumbs and fingers of both assistants should be well dried after sterilization, to allow them to grip more firmly. I regard this as a point of some importance.

I always allow them to do this on the far edge of the sterilized towel which I place over the patient's head. This portion of the towel does not come into the field of operation and if the operator makes a practice of presenting this corner to the assistant before he places it over the patient's head, it serves as a reminder to the assistant. It ensures the use of a perfectly sterile towel each time, altho only one is required for each operation, a consideration, if there are a large number of operations, as in India.

I find a small piece of sterilized cotton wool placed under the thumb of the left hand of the assistant who is controlling the lower lid, gives a firmer hold and prevents slipping upwards of the lid if the patient strains.

The assistants can learn their duties in a very short time, whereas it takes a long time to train a single assistant.

At first the use of two assistants may seem complicated to an onlooker, and they may appear to be in the operator's way, but if anyone will try this method in a simple iridectomy case first, to get accustomed to it under easy conditions, I am sure he will not care to go back to the old method. Apart from the fact that the old method is no better, if as good, it makes him dependent on the presence of a single person. If this person is absent he cannot do an operation in safety or comfort. If either of the two assistants be absent anyone can place his thumb on the orbicularis muscle and the operation can be done in comfort.

In Europe and America, where the assistant is usually a house surgeon, whose tenure of office is generally a year, and the number of operations for cataract not very large, there is not time to train a man properly during his term of office. A man can learn to assist with safety after a few operations by this method. The advantage of this will appeal to all practical surgeons.

I have now used this method for two and a half years and I prefer it to the older method of using only one assistant, as described by Colonel Smith in his book and other writings. I know from personal experience as an assistant and from painful experience as an operator, that in a very bad patient in which the operation is sometimes necessarily prolonged, the fingers of the assistant get a little tired and the firmness of their grasp relaxes. This allows the orbicularis muscle to act and escape of vitreous may result. By this method the assistant can control the orbicularis muscle and hold up the upper lid quite steadily for a long time.

I have used this method also in capsulotomy operations in bad patients with great advantage.

I have seen what are called bad patients on the operating table in England and on the continent, but I have never seen anything to even approach a really bad Indian patient. Some European writers have written about the docile Indian patient. In my part of India these are few and some of them are so bad that I cannot imagine anything worse.

I can therefore confidently recommend this proceeding. Many surgeons who have visited my clinic and seen this method in use have expressed the opinion that it is a valuable one, and in their opinion removes one of the chief drawbacks to Smith's operation.

The assistants change their duties daily. This keeps both in practice. If one happens not to be able to come, a nurse can control the orbicularis muscle quite well. I, however, usually teach my theatre nurse how to do this as well as the usual assistants, so that I may have her to fall back on, if required. Letting her do it once or twice is quite enough to make her efficient.

In my opinion, in spite of the many other appliances which have been advocated, the use of the strabismus hook for lifting up the upper lid has the great advantage, that it does not take up much room. A very essential point, especially in some cases. In the method I advocate, if one wants a little more room at one side, when replacing the iris, it is a very simple matter for the operator himself to adjust the hook in such a way as to give this. The assistant soon learns to allow him to do this, and when the hook is in the desired position, he lifts it up a little, which gives a good exposure of the upper surface of the globe.

A good assistant will do this himself but it is a great advantage to be able to do this one's self, if he does not see what is required.

TESTS FOR DETERMINING THE SIGHTING EYE.

CAPTAIN PERC. DOLMAN, M.C.
Research Laboratory, Mineola, N. Y.

There is considerable literature devoted to the subject of the sighting eye, but reference to specific tests for determining which eye is habitually used for sighting are difficult to find. This is probably explained by the fact that the act of sighting or aligning two objects is such a common experience in life that tests may easily be borrowed from this source. Few of these tests, however, meet the exact requirements of research work.

The possible coordination between the sighting eye and right- or left-handedness must be considered in selecting a test. Serious attempts have been made to establish this association between the dominant eye and the dominant hand in spite of the fact that no anatomic relation can be demonstrated. Until our knowledge on the subject is increased by scientific experiment, the possible influence of either hand should be eliminated from the adopted procedure. Tests made by pointing with either forefinger or with a pencil held in either hand or by sighting thru a ring held in either hand are open to criticism for this reason.

In another form of test the observer approaches a stationary object such as a vertical rod and aligns it with another object located some distance away. This procedure is free from the influence of either hand but it frequently happens that, in walking toward the first object, the nonsighting eye is carried in line with the two test objects by a mere accident of head position. Such a test is unnecessarily inconvenient in addition to being unreliable.

During a recent investigation of the influence of fixation on the measurement of heterophoria, on the relation of the sighting eye to the measurement of heterophoria, it was necessary to test each observer for his sighting eye. Experiments were made with various tests and a conclusion reached that the possible influence of either hand would be greatly reduced by holding the first test object in both hands. A 13x20 cm. card with a 3 cm. round hole in the center was employed instead of the customary pencil or pointer. The use of such a card compels the selection of one or the other eye for sighting thru the hole, thus eliminating a certain percentage of negative results which are obtained when the first and second test objects are aligned with some point between the two eyes.

The test is performed by having the observer grasp the short ends of the card with both hands and raise it slowly at arm's length while looking intently at a spot of light six meters distant. He is instructed to keep both eyes open and locate the light thru the hole in the card. The eye selected for this purpose is the sighting eye.

This test has been made repeatedly on the same observers with intervals of several days between trials. The eye that was selected the first time, whether the right or left, was invariably selected at the later tests.

The apparatus required for the test just described is both simple and convenient. It does not permit the selection of a sighting point situated between the two eyes but forces the use of one or the other eye for the act of sighting. The possible influence of the right or left hand on the test is greatly lessened by having the card held in both hands. The results obtained with it are consistent in repeated trials with the same individual.

SOCIETY PROCEEDINGS

AMERICAN OPHTHALMOLOGICAL SOCIETY.

FIFTY-FIFTH ANNUAL MEETING

Atlantic City, June 14-17, 1919

President, DR. LUCIEN HOWE, of Buffalo.

(Concluded from page 763.)

Lethargic Encephalitis.

DR. HIRAM WOODS, Baltimore, reported six cases in which the diagnosis of this curious disease seemed justified. A seventh case was included because of the characteristic eye disturbances and negative pathologic findings on thoro study. Lethargy, however, was not present to any extent. The case was the only one which terminated fatally, apparently thru involvement of the respiratory centers. Autopsy was not allowed.

Of the six cases, lethargy was the first symptom in three. This was soon followed by ocular disturbances. In three the eyes were first affected. Eye symptoms divide themselves into tw classes: (1) Those without paralysis, but showing curious spasmodic movements of certain muscles when others were called into action. (2) More or less complete ocular palsies. These included ptosis, convergence, pupillary action, accommodation, inferior recti, and a transient paralysis of the externus in one case. The nuclei of the third nerves seem the points of most frequent attack. In but one case was there optic neuritis.

Recovery was slow; indeed, after two or three months some of the patients were not well. Apparently this disease is not well understood; and it is especially likely to come under the observation of the opthalmologist.

DISCUSSION.—Dr. Arthur J. Bedell, Albany, N. Y.—Dr. Woods' paper has been of much interest to me for, during the past six months, it has been my privilege to see forty-eight cases of lethargic encephalitis. The variation in the severity of symptoms is one of the most marked features of the disease and doubtless many of the mild cases have either passed unrecognized by physicians or even without medical advice.

Three more or less distinct types have been clinically noted in my cases. The mildest characterized by sudden diplopia often so transitory and slight that before all serologic tests were completed marked improvement or recovery had been reported. On examination, these showed a rapid nystagmus, usually lateral but the vertical not uncommon. There was a tendency to convergence, with sixth nerve paralysis, headache and the usual sense of insecurity.

The next severer type had diplopia practically for all distances, the general discomfort such as headache and mental depression greater, the nystagmus more marked and usually accompanied by other nerve pareses such as the third, fourth, eighth, ninth, tenth and eleventh nerves. The duration is longer and in some of my cases the mental side was so great that the patients were unfit for work, and two of them were confined to institutions of detention.

The severest type is illustrated by a case, first seen by me, in a sleeping state, having given a history of progressive somnolence with diplopia. The sleepiness progressed and despite all treatment, the patient died. Autopsy revealed the findings considered characteristic in this disease.

The clinical condition of lethargic encephalitis is more commonly recognized by the ophthalmologist and it is proper that Dr. Woods' paper be given prominence.

Dr. G. E. de Schweinitz, Philadelphia. I have had the opportunity of seeing a number of ocular complications in connection with socalled lethargic encephalitis. All had the lethargic and somnolent stages; but in all, the first ophthalmic symptom was diplopia. Mostly the only muscle affected was the external rectus. There was one case in which, I believe, the muscle affected was the superior oblique. Then there were a few cases in which oculomotor palsy, with ptosis, was the ocular phenomenon. In all these cases, one of which I have studied since the onset of the somnolent stage, there has been a marked impairment of accommodation.

The third group is a very severe one, in which there is practically complete ophthalmoplegia externa. The most of the cases occurred in one of our camps, some of these cases proving fatal, and some being in the process of recovery. They formed part of a report not yet liberated from the Surgeon General's Office.

Dr. E. A. Shumway, Philadelphia. I have seen, during the past winter, six cases of lethargic encephalitis, three in private work, one with Dr. Spiller, one in the University Dispensary, and one in the Lankenau Dispensary. In four, the sixth nerve was involved alone. One had the oculomotor affected with the sixth; and later the lower centers became affected, and death occurred, apparently from sympathetic failure caused by involvement of the medulla. One had fourth nerve paralysis, and then the oculomotor became involved; then the sixth and seventh nerves; and then there was respiratory failure.

One case was seen with Dr. Spiller. We thought that death would ensue, but he has recovered, and is nearly normal, except for his mental condition. He showed marked lethargy. One was a fatal case, in which the patient could be aroused only with difficulty. One was in a stupid condition, which seems characteristic of some cases. He could be aroused, and would answer questions properly; but would immediately lapse into the same condition again. If left alone, he would have a muttering delirium, and talk to himself; and if spoken to, would arouse and answer questions. The delirium persisted for weeks, until he recovered. He is practically normal now, but has no confidence in himself and does not feel that he can go on with his work.

In one case with optic neuritis, death ensued, but no autopsy was permitted. This case occurred in the Lankenau Hospital. In four cases, there was a definite history of influenza. One was the fatal case. One was complicated with positive Wassermann findings, and an increase in the cell count in the spinal cord. These symptoms had appeared very suddenly, and Dr. Spiller, who saw the patient, thought that the case could be considered as of the lethargic encephalitis type. He recovered, and his oculomotor palsy disappeared; and, with the exception of weakened accommodation, the ocular condition has cleared up.

At a meeting of the Philadelphia Neurological Society this spring, Dr. Spiller reported, in addition to two of these included among my cases, one other case; and two fatal cases were reported, one from the Philadelphia Hospital, in which typical autopsy findings were obtained; increase in the cells around the blood vessels, and hemorrhage around the nuclei in the bulbofrontal region.

Dr. Spiller at one time felt that the influenza should be very strongly considered as a cause of these cases. It was not definitely positive in all cases; but he felt that it might be considered, as the infection from the toxin of influenza affecting the cord and brain, rather than localizing itself in the respiratory centers or the intestinal tract.

Dr. T. B. Holloway, Philadelphia: I think that Dr. Shumway, in referring to what Dr. Spiller had said, has hit upon one of the affections from which it is difficult to differentiate the milder forms of this condition. It is almost impossible to wholly eliminate influenza as a possible source of confusion in these cases, unless we include it as an important factor in the production of this condition. It is by no means an easy matter to differentiate mild specific cases. The diplopia fields are also difficult to work out, especially if the patient has a partial ptosis which may increase during examination.

Dr. Hiram Woods, Baltimore. What Dr. Holloway says about the diagnosis is undoubtedly true. My last case was in a young man who had been in good health all his life, but who developed a facial neuralgia on the right side. That was followed, in a week, by right ptosis; then by paralysis of the oculomotor nerve; then by a paralysis of the left external rectus. Vision was normal. The intrinsic muscles were spared. That man was sent to the hospital, and all possible examinations made. The results were typical of the general findings, but the patient died of respiratory paralysis. A few days before his death, we discovered some little nodules, barely palpable, on the scalp. One was excised; and after examination, it was found to be a leucosarcoma. The question is, Did he have this disease, or a sudden metastasis of an absolutely malignant growth? An autopsy was not allowed.

A telephone operator suddenly saw double. She went to see a retired oculist, and he found a decided left internal squint. He put atropin in her eyes; and when she came to see me, a day later, she had complete cycloplegia. Her refraction was measured. She had an internal squint, a partial paralysis of the external rectus, and a complete atropin cycloplegia. That occurred the second of March. She still had a maximum accommodation of only 2 to 2½ diopters. The thing cleared up. The way the diagnosis was made was that she went home from my office and slept continuously for ten days. Then they woke her up and brought her to see me; and I found that the accommodation was paralyzed still. She went home and slept for another ten days. Nearly three months afterwards, she still has only a very low range of accommodation.

Coloboma and Congenital Dislocation of Lens.

Dr. C. F. Clark, Columbus, Ohio, reported the farther history of a case of coloboma described by him in 1894. This patient had shown little increase in myopia, but decided increase of astigmatism. His lenses remained clear but he showed slight evidence of early presbyopia before his death at the age of 34. In a case of dislocation of the lens then reported, there was myopia and a modification of the astigmatism apparently due to tilting of the lens. The cases of this kind encountered in 35 years numbered 11, of which 8 showed coloboma, and 4 dislocation, one patient showing both conditions.

Seven cases occurred in the children and grandchildren of one man, who was probably similarly affected, and his father also.

It seemed remarkable that in some of these cases of coloboma, where as much as one-third of the suspensory ligament seemed to be absent, there was good power of accommodation. In one case of dislocated lens, R. + 18. sph. ≍ 1 cyl., and L. + 18.5 sph. gave standard distant vision, and with same glasses the patient read small print.

Discussion.—Dr. W. E. Lambert, New York. In two cases in which I have operated by excision of the lens, the visual result has been most excellent; and in all the background of the eye has been normal. One of these children, a girl of ten, had such poor vision that it prevented her from attending school; and for that reason, operation was decided on. The mother had a luxation of the lens, but so slight that it did not interfere with vision. Both of these children were needled. The visual result in the girl was 30/40 plus, in one eye; and 20/50 in the other. In the boy, the operative results seemed less favorable. In all these children, the phenomenon that Dr. Clark alludes to, of being able to use the same lenses for near as gave them this distant vision was noted. They were unable to read comfortably, and apparently had some interference with accommodation.

Dr. A. Edward Davis, New York. I wish to relate a remarkable case of this kind. The girl was eight or nine years old. It was interesting to observe the suspensory ligaments in that case, when she made efforts at accommodation; and also the shortening of the diameter of the lens. We gave her glasses. I have had her under observation for fifteen years. The lens is luxated upward and backward. The patient's vision has been gradually reduced, on account of cataract formation. I think that the accommodative power in some of these cases is good, I believe even up to the normal.

Dr. Lucien Howe, Buffalo. These cases seem to have three very interesting features; the questions that arise physically; the question of the treatment; and the particular interest of this group from the hereditary standpoint. The last is a phase of the subject the importance of which is just dawning on us. When defects of vision are transmissible and pertain to eugenics, and are of the dominant, instead of the recessive type, it is our business as ophthalmologists not simply to report them here to one another, but to attempt to evolve some method of procedure that we may recommend to our confreres, and to the Legislature if necessary, as to what shall be done in regard to this matter. Which are the characters that are dominant, and will be transmitted, which we should do something about; and which characters are of the recessive type, and do not interest us particularly? It is for us to express an opinion, if necessary a collective opinion, so that it may have some effect on the community and coming generations.

Dr. E. V. L. Brown, Chicago. In regard to the transmission of these defects, important work is being carried on at the University of Wisconsin. The triturated lens from the wild albino rabbit is introduced into the blood of roosters, thereby sensitizing the fowl's blood to the lens of the rabbit. Then this blood is reinjected into the rabbits, and has in a number of cases produced coloboma of the iris, and opacities of the lens. At first, the investigator got few results; but when he introduced the blood into the pregnant female and into litters in various stages of development, he produced these changes. In some cases, he carried these changes on, generation after generation.

Dr. C. F. Clark, Columbus, Ohio. So far as the operative work is concerned, I did not go into the question of coloboma and dislocation with reference to that point of view. What I was interested in was this refraction problem, in the cases that have retained clear enough lenses to enable us to follow them thru a period of years.

Ocular Anomalies of Development.

Dr. William Zentmayer, of Philadelphia reported a case of multiple dermoids, there being bilateral sclerocorneal dermoids and a dermoid of the right cornea. There were also supernumerary tragi and macrostomia. The patient was female, and the various operations required for cosmetic purposes were described.

Retinal Tuberculosis.

The paper of Drs. Edward Jackson and Wm. C. Finnoff has been published in full, p. 715.

Discussion. — Dr. Arnold Knapp, New York. I have been very much interested in this subject of retinal tuberculosis — periphlebitis, socalled, and these cases bring up a number of questions I should like to ask in regard to the first case, how the writers explain the presence of the deep corneal lesions. It has always seemed to me characteristic of this process that the manifestations are in the anterior or posterior part of the eyes and if you have periphlebitis, you usually do not have lesions in the anterior part.

In the second case, if I understand corectly, the socalled mascular figure developed. That has always been associated with an exudate into the retina, irrespective of the etiology. I should like to know whether an exudate was present in this case. In regard to the third case, which I had under my care at one time, I should like to ask Dr. Jackson as to whether he is optimistic about what he can accomplish by means of tuberculin treatment in preventing a recurrence of these hemorrhages.

Dr. C. D. Wescott, Chicago. I wish that, in closing the discussion, Dr. Jackson would tell us his present method of using tuberculin especially in cases in which he continues the treatment over so long a period of time as he has mentioned in one of these cases.

Dr. H. M. Langdon, Philadelphia. A girl, sixteen years of age, came complaining of blurring of vision in the left eye. On examination, she was found to have a very slight haze in the vitreous, with, in the lower temporal branch, about a disc diameter below the macula, and about half the size of the disc, a well defined patch of exudate. She had been apparently in perfect health, but physical examination proved that she had a well advanced apex tuberculosis, as proved by the tuberculin reaction, temperature study, physical examination and the x-ray. On account of the lung involvement, it was deemed unwise, for the time being, to use tuberculin; and she was placed on the ordinary hygienic measures proper in such a condition. With these, in six weeks the ocular condition entirely cleared up, leaving nothing but a small, poorly defined scar in the retina. Vision was 6/5. Some cures that we attribute to tuberculin may not be due to this, but to the systemic measures taken, as well as the systemic reaction produced by the tuberculin.

Dr. Edward Jackson, Denver. The third case, as Dr. Knapp correctly surmised, was a case he had seen and in which I think, he first instituted tuberculin treatment. That man has apparently recovered. He was under a pretty strict regimen when he first came to Colorado, that has been gradually relaxed. After a time he was allowed to play tennis and take walks, and gradually play longer and walk greater distances. Then he was permitted to resume his studies. Finally, a few weeks ago, the question came up as to whether he could come East for about six weeks, to complete his studies to enter the priesthood. I advised him strongly against it. I said that while he was relatively in good health, his continuance in good health remained dependent upon his observing the conditions under which he had attained it.

This brings up the matter of the value of tuberculin in these cases. As will be noted, we concluded that the regimen, the life, or the general treatment of tuberculosis should be observed in every case; but that tuberculin should be reserved for those cases that are free from decided temperature changes. A variable temperature curve, dropping each day below normal, tho not going much above it, may have the same significance as a distinct daily rise in the temperature. To those that are free from this, and have no large active tuberculous lesion, it is wise to give the 1:100,000 or 1:500,000 of a milligram of old tuberculin. But this treatment is not applicable to a patient with large tuberculous deposits. When the patient is free from them, the cases I have been able to follow have given the impression that the ocular lesions did better and came to a final cure under tuberculin, when they would not without it. The tendency to relapse is the final test of a relative cure that is brought about by tuberculin.

With reference to the method of administration, I have had the assistance of an internist in all these cases that I have reported. Dr. C. N. Meader saw the cases that I referred to today. I am certain of the importance of small doses at long intervals. One of these cases began the therapeutic use of 1/500,000 of a milligram, repeated at intervals of a week. Another case was getting a somewhat larger dose; but in that case, when the dose was raised to 1/10,000 of a milligram, or more than that, he seemed to do rather badly. The interval was lengthened, and the dose dropped back.

In the present state of our knowledge, the use of tuberculin is experimental, and every case should be watched as an experiment. But the things that stand out most clearly in my mind are that the doses should be small (not to give a trace of a reaction is better than to give a big reaction), and that the intervals should be long. Tuberculin, if it does good, does it by starting a certain reaction in the system; and until that reaction has time to occur and be complete, the dose should not be repeated.

With reference to the question of the corneal lesion; this is the only case that I have seen in which there were distinct lesions in the anterior segment that were followed by retinal tuberculosis. But in this case, the connection seemed pretty definite. I have seen in one other case marked vitreous exudates entirely free from any connection with the retina, there being apparently no diseased tissue between them and the retina. They were far forward in the vitreous. I suspected that in that case there had been lesions in the anterior segment.

Subretinal Exudate Resembling Sarcoma of Choroid.

Dr. Arnold Knapp, New York, reported a case of this character in which the diagnosis was cleared up by anatomic examination of the enucleated eyeball.

The patient, male, aged 71 years, presented a sharply defined mass in the macular region, dull white in color, with some mottling, and an elevation of 3 D. In the absence of inflammatory or vascular changes in the eyeground, the diagnosis of sarcoma of the choroid was made and the eye enucleated.

The microscopic examination showed a subretinal mass of organized connective tissue between the choroid and retina. The choroidal and retinal vessels were normal.

The case chiefly resembles the type described by Coats as retinitis with massive exudation, except that the swelling occurred in the macular region in a patient of advanced years and with no vascular changes.

The other eye subsequently developed central chorioretinal changes consisting in deep retinal hemorrhages, pigmentation, atrophy of retina, superficial atrophy of choroid, and changes in the choroidal vessels.

Discussion.—Dr. F. H. Verhoeff, Boston. I have recently examined an eye from a case similar to this. I feel sure that this tissue is produced by the pigment epithelium. The socalled chorioretinitis is due to changes in the pigment epithelium, and do doubt, caused by arteriosclerosis. It is a hyperplasia of the pigment epithelium. While I have seen pigment epithelium in other parts of the retina, I do not recall having seen it here before; but I think that Dr. Knapp is undoubtedly correct in thinking that it is due to some changes caused by arteriosclerosis; and the fact that the other patient had senile chorioretinitis substantiates it.

Dr. Edward Jackson, Denver. I recall a case in which, on the first examination of a tumor of the choroid at the macula I made a probable diagnosis of sarcoma. The swelling was 1½ or 2 diopters, and pretty sharply limited at its margins. There was a history of central scotoma going on for several weeks. There was a negative Wassermann, but the patient was put on potassium iodid; and in the course of three or four weeks, the edge of the tumor was distinctly less abrupt. This went on; and within four to six months, all symptoms of a tumor in that region had disappeared.

Choroiditis from Sinus Disease.

Dr. John E. Weeks, New York, reported two cases of a typical disseminated choroiditis, due to disease of the nasal accessory sinuses. The first was that of a man seen in 1908. Three years before the right eye had become affected and now the left was involved. There was no history of nasal disease. The fields of vision were contracted, and R. showed a central scotoma. The choroidal exudate occupied a circular area.

In 1917 acute glaucoma set in. Under myotics the vision of the left eye was brought up from 14/200 to 20/90. X-ray examination showed the sinuses all cloudy. May 20th, 1918, a new attack of glaucoma occurred. A Lagrange operation was done and the antrum and ethmoid were opened. After this the eyes became clear of inflammation and vision rose to 20/20. At one time symptoms of a recurrence had arisen after blocking of the ethmoids.

The second case was that of a man aged 29 seen this year. There were patches of choroidal inflammation and vision was reduced to R. 20/200, L. 20/30. The X-ray showed the ethmoids and sphenoids cloudy. These were opened and found to contain many polypi. Drainage was followed by prompt recovery.

Visual Acuity at Low Illumination.

Prof. C. E. Ferrée, of Bryn Mawr College, presented a lantern for testing vision by exact illumination and read a paper which will be published in full in this Journal.

Radium Treatment for Tumors.

DRS. GEO. E. BELL and SINCLAIR TOUSEY, of New York, reported a case in which a tumor of the orbit extended on to the brow, and it had followed trauma. The eyeball had been pushed out of the orbit. The application of 20 mg. of radium bromid was continued one hour and repeated every two weeks from Dec. 19th to April 1st. At first 5 tubes were used, but after the shrinking of the tumor was well started only two. The growth shrivelled, and an apparent cure was the result.

Discussing radium as a therapeutic agent, and its value in malignant and nonmalignant tumors of the orbit, they concluded that it should be used in all nonoperable cases. It should also be seriously considered in the treatment of intraocular tumors. The therapeutic value of radium is now well established, altho it is not used by ophthalmic surgeons so often as might be expected.

DISCUSSION.—Dr. T. B. Holloway, Philadelphia: Dr. Bell has referred to the use of radium prior to operations on tumors of the orbit. I think that much would depend on whether the orbit is the primary seat of the growth or whether it has been encroached upon from neighboring structures. To my mind, radium may well supplement operative procedures, probably better than operative procedures may supplement radium, in certain types of tumor formation. You may recall that I reported, some years ago, the history of a case of sarcoma with bilateral orbital involvement, in which, immediately after the operation, radium was packed into the orbit with the primary dressing, 25 milligrams being allowed to remain for eight hours. That procedure has been used in another case, which was inoperable and where adjacent structures were involved. The patient was under treatment by Dr. Pancoast; and I think the treatment prolonged the patient's life, altho the result was inevitable. Since then, radium was used in another patient who had an inoperable carcinoma involving the temporal region. At times evisceration of the globe may seem preferable to evisceration of the orbit. Such was the case with this patient, but local applications of radium interspersed with X-ray treatment, was kept up in all the cases I have referred to except the infant with bilateral sarcoma.

I have another patient, an Italian, observed three years ago, whose history I have already reported. The growth in this instance was an epithelioma of the lids which had involved the orbit. In this case, excellent results were obtained by the application of radium after curettage and evisceration of the orbit.

Dr. F. C. Clark, Columbus. Five or six years ago, I ventured to use radium in an orbital growth in which I was making an exploratory incision. On examination, it proved to be a vascular growth; a mass of enlarged vessels in the apex of the orbit. The patient was a child of 2½ years. This was before the use of radium had been so well developed as it is now. I opened, to have access for a small tube; and I used it without protection around the tube.

I did a canthotomy, and detached the external rectus; and, by means of a speculum, obtained a fair view of the orbit. Finding this condition, a surgeon near at hand passed the radium over, and let me use his tube. I embedded it, and left it in for two or three hours, and then removed it. A few days later, I repeated the process. I had excellent results, and the eye receded. The eye was one that already had no vision, so it made no special difference, but he developed a zonular cataract. I should like those who can, to tell us what experiences they have had in that respect; and whether, in using radium for this purpose, we could guard ourselves against this accident.

Dr. Robert S. Lamb, Washington. I have had no experience with radium that has been completely satisfactory. I have been relying on the X-ray to supplement operative procedure. It seems that we can operate on almost any tumors, even if we are unable to control the cosmetic effect. We can operate on tumors that are very extensive, by using the knife cautery outlining the mass, and going into the orbit.

Dr. Dunbar Roy, Atlanta. I should like to ask Dr. Bell what was the duration of the treatment.

Dr. Derrick T. Vail, Cincinnati. Mr. F. M. D., aged eighty-four years, came to me ten years ago on account of slight exophthalmos of the right eye, associated with ophthalmoplegia externa. He also had some complications in the eye, like cataract formation; and the vision in each eye was very much below par. In the affected eye, it was reduced to 21/100. He had never possessed robust health. I saw him from time to time, and this growth continued. It seemed to be in the orbit, behind the eyeball. The ptosis continued; the ophthalmoplegia persisted. Last September, he came in, presenting a very sad picture. He was very senile physically, but mentally very bright, and capable of enjoying life, and was desirous of being relieved of the tumor, which was very conspicuous. He was having no pain, but had come to find out what I could suggest. I advised him to go to Johns Hopkins and try the radium treatment. He went; and I did not see him until February, when he came with the mass entirely gone. The growth of the orbit had enlarged the orbital confines until it was one-third larger than the other. This permitted the eye to fall back, so that there was a suggestion of enophthalmos. The eye, which had been blind for a long while, had perception of light. Having received a demonstration of what radium is able to do in a case of this kind, I should try it in another instance. I do not know the character of the growth, but it had persisted ten years. The cure was complete.

I believe, however, that this treatment is not so desirable for cases of glioma. If the glioma can be diagnosed before it has produced increased tension, I think that it would be better to enucleate the eye than to try to cure it with radium.

Dr. George H. Bell, New York. In regard to what Dr. Holloway stated, I think it is better to use radium first. Then, sometimes, you will not have to operate at all. Try the radium again, after the operation, if an operation is necessary.

In regard to Dr. Clark's remark, so far, we have not got any cataract from the treatment of the tumors with radium.

Replying to Dr. Roy's question, I saw the woman eight months ago, and she was feeling fine.

Dr. Vail's case is very interesting and encouraging to all of us who are interested in radium. Dr. Tousey has got some wonderful results with it, and thinks that all these tumors can be absorbed by the use of radium.

Tuberculin Reaction in Sarcoma.

Dr. J. W. Charles reported the case of a man aged 24 years who gave the history of a burn of the right eye 8 years before. Deep seated ocular pain developed 5 years later. When first seen the eye presented exclusion of the pupil, cataract, ciliary staphyloma over the upper portion of the eye, and a small nodular swelling on the sclera in the lower inner quadrant. The Wassermann reaction was negative; but the eye gave a positive focal reaction to tuberculin. The eye was enucleated and the diagnosis made of spindle-cell sarcoma which had perforated the sclera.

Intraocular Tumor.

Dr. Howard F. Hansell, Philadelphia, presented a clinical and pathologic report of a case of intraocular tumor.

At the first examination the retina was totally detached from the choroid. No signs of intraocular inflammation, no pain, tenderness or injection, or history of traumatism. Gradual increase of tension and shallowness of anterior chamber; dilatation and immobility of pupil developed. Enucleation and implantation of a gold sphere were done. It proved to be a choroidal growth.

Epithelioma of Eyeball and Lids.

Dr. Dunbar Roy, Atlanta, reported two cases treated by removal in which there was no return after six years.

Case 1. W. A. F., farmer, aged fifty-four years. Seen in June, 1908. Inflammatory irritation of the left eye. At the sclerocorneal margin there was a gelatinous mass. Section of the same showed epithelioma. V. = 20/50. The growth was thoroughly removed and the base cauterized. Eight months later return with infiltration of conjunctiva. The eye was enucleated. Three weeks later, on account of the suspicious appearance of a remnant of conjunctiva, the orbital contents were eviscerated. Healing by granulation. Eleven years later the cavity is smooth and there are no signs of recurrence.

Case 2. Mrs. J. W. W., aged thirty-three years. Epithelioma at the inner canthus of the right eye. Treated for months by a dermatologist. Operation of evisceration of the whole orbitral contents with upper and lower lids. Healing by granulation. Six years since operation, no signs of a return.

Discussion.—Dr. R. S. Lamb, Washington. Prior to seven years ago, I used to cut first, and then use the X-ray. Since then, I have used the X-ray a short time before the operation. Sometimes I use it to relieve the excruciating pain, and then operate within twenty-four hours. I have used the X-ray prior to operation, also, to close the lymphatics and prevent the tumor from spreading in metastasis. At the time of the operation (stopping the ether long enough to do the work) I have taken the cautery knife and separated the tumor, after exenteration from the healthy tissue.

In cases of glioma in which extension has not gone beyond the globe and is not anterior to the equator, I find that enucleation with one-half or three-fourths of an inch backward on the nerve, and cauterizing the area from the sheath, is sufficient. I have had no recurrences in these cases.

Three weeks after the first X-ray, which was several days before operation, there is another treatment given; and so on for six months, every three weeks. After that, the treatments are given at intervals of six weeks.

Dr. Clarence A. Veasey, Spokane. In connection with this paper of Dr. Roy's on epibulbar epithelioma, I should like to exhibit the photographs of a case that is somewhat unusual, recently seen and recently operated on. This patient had apparently always been in good health. His age was fifty-six. Many years before, he had observed a small pigment spot on the sclera; to the temporal side, to which he paid no attention. For two or three years, it had been increasing in size; and by the time I saw it, the anterior segment of the eyeball was covered, and over it, the growth was roughened and covered with a crust, evidently ulceration.

Although the patient lived within a few hours travel of many ophthalmic surgeons, he had consulted no one until he appeared for operation; yet the small spot had been observed in childhood.

Dr. C. H. May, New York. It may be of interest to report a case similar to that of Dr. Charles, in which there was a decided focal reaction in a patient who had a tumor. A child three years old was admitted to the hospital; and a small dose of tuberculin was given which caused a violent reaction. The dose was exceedingly small, as it is known that children react very easily to tuberculin. The child's eye presented a dirty, yellowish exudate covering the pupillary space and the iris. Tension, normal or diminished. The child's physique gave one the impression of tuberculosis. Tuberculin was used in increasing doses for two or three months, and the result seemed good. The exudate cleared up; the details of the iris became visible; the pupil could be seen.

There were, at times, violent reactions to the tuberculin; but these were ascribed to the fact that children are very susceptible to tuberculin. There was no question in the minds of the men watching the case that it was one of tuberculosis.

At the end of three months, there was a violent reaction, which was attributed to the possiblity that one of the internes had made a mistake in the amount to be injected. Following this, there was increase of tension. The eye became red and sore; and it was concluded that since there was probably no sight there, it would be better to enucleate the eyeball. At operation, it was found to be a case of glioma; and the growth had extended beyond the optic nerve. I have no doubt that the case went on to a fatal termination. In that case, the positive reaction presented to tuberculin misled me and prevented me from adopting enucleation, which might have saved the child's life.

Dr. C. F. Clark, Columbus. Early recognition of the exact character of an intraocular tumor, is of the utmost importance. I think that Dr. Hansell said that early enucleation does not prevent metastasis. I should like to know whether he really means that. I have under observation a case of melanosarcoma which will illustrate my point. The patient has been under observation for a long time. We used radium, with little effect; and I removed the eye as soon as I felt sure that I was dealing with a serious growth. But I was not positive until the patient came to me with beginning enlargement of the eyeball, of which there was no indication a few weeks before. I immediately enucleated the eye. The patient is a young lady; and there is no hope for her, if Dr. Hansell's statement is correct.

I have several eyes with sarcoma of the choroid, removed after they had attained the size of half a marble; and I have seen the patients six or seven years afterwards, with no metastases.

Dr. Hiram Woods, Baltimore. There are two points in Dr. Hansell's paper to which I should like to draw attention. One is as to the value of transillumination. Some time ago, I saw a child about five years old, who presented what was clinically a glioma of the retina; and there was no history of former inflammation—no clinical evidence of a uveitis. The transillumination was taken in a dark room, but when we reached the area of this growth (it was well forward, and there was no possible reason why we should not see it correctly), everything became dark in the pupil; and yet, when the eye was enucleated, it proved to be nothing but an inflammatory mass. It would have cleared up. The whole thing had been due to some former inflammatory trouble, which could not have been brought out in the history.

My experience with metastasis is very limited; but I think that it is much more frequent than Dr. Hansell has seemed to indicate. I ask an expression of opinion on this general question: Given an eye in which transillumination is lost, and in which there are definite evidences of a sarcoma, but in which vision is left, what is the consensus of opinion as to the use for any length of time of radium, Roentgen rays, or anything elese in the place of enucleation?

Dr. Wescott shakes his head, and I suppose he is right. He certainly is, according to my limited experience. But you have that question put to you. Dr. Harlan will recall a man who made the rounds in Baltimore, and everyone gave the same opinion concerning the case. He had a growth that caused loss of transillumination, but he had good vision. This is a primary question, and one that bothers us every time we see a case; and I should like some expression of opinion from the essayists, as well as others, as to whether their experience with radium, of which I have had none, shows that we have got to a point where we are justified in waiting any length of time after the diagnosis is made.

Dr. George F. Fiske, Chicago. Some years ago, I published a series of cases of tumers in the bulb, which were all melanosarcomas. Seven out of fourteen never recurred. The recurrence, when it did take place, was always a year after the operation. I believe in early enucleation, and that this is the thing to be done.

Dr. C. D. Wescott, Chicago. If I understand Dr. Hansell correctly, he said that he had not seen a metastasis, I want to congratulate him, because my experience has been so sad by comparison. I have seen metastases that manifested themselves anywhere from a few months to seven years afterwards, and were proved by postmortem to be metastases. I have reported before this society some cases of flat sarcoma in which the specimen showed that even in the presence of a very little tumor, tumor cells may pass thru the vascular channels entering the globe; and that we may have involvment of the extradural tissues when the tumor that we can see inside the eye is comparatively small. It has been my practice, as soon as I could satisfy myself that I had a malignant tumor in the eye, eliminating other things by the best means of diagnosis at command, to advise enucleation immediately; and if this is not consented to, to abandon the case. I have heard from a patient living fifteen years after the removal of a globe which contained a circumscribed, almost intraglobular sarcoma, as demonstrated by careful examination. So far as my knowledge goes, that is the only patient who has survived for that length of time in my experience of over thirty years.

The location of that tumor was almost at the equator of the globe. It was back of the ciliary body.

Dr. E. B. Heckel, Pittsburgh. Experience has taught me that with epibulbar growths it is best not to operate, but to try to remove the tumors by means of the X-rays. Their application has been difficult, on account of the length of exposure and the danger of burning and producing necrosis of the cornea. Some years ago it occurred to me to make exposures under constant irrigation with normal salt solution; and I reported this procedure in a case in which the cornea escaped and the eye was not injured in the slightest degree. The result was absolutely permanent; and the cure was perfect, and remained so for five years, after which the patient died from other causes.

Dr. Allen Greenwood, Boston. I am very glad to hear that Dr. Wescott recommends very early removal of these tumors; and I wish to justify Dr. Knapp's removal in the case that he said gave all the appearances of a sarcoma of the choroid. He immediately enucleated; and we should all do the same thing.

My experience has been also rather a sad one. I have two cases in which the sarcoma was removed in the primary stage; and in both, the tumor, on examination, was found to be of very small size and situated in the equator. In one, it was only a little larger than a bean. Both patients were men. One, after five years, died of sarcoma of the liver; and the other died of the same complication after four years. With that experience, I cannot help feeling that the sooner sarcoma of the choroid is removed, the better for the patient; and no matter how early it is removed, there is the possibility of metastasis in the liver.

Dr. J. W. Charles, St. Louis: I was sorry that no one said anything about Coley's fluid. In St. Louis, our surgeons feel that they have had some distinct successes with it; and I cannot help feeling that in these days of X-ray and radium treatment, perhaps Coley's fluid has been neglected to some extent in sarcomata. When neither operation nor radium, nor the X-ray, will prevent recurrences, Coley's fluid will perhaps do some good, and I would strongly advise that it be tried.

In that connection, I would say that Dr. McAmis wrote me that he had a boy of nine years, who had had the orbit cleaned out, and apparently the entire growth removed. He had had a recurrence, however, and was put on Coley's fluid; and, five years later, was well. Another case of nasopharyngeal sarcoma, Dr. McAmis saw also. It had recurred after being operated on twice. He suggested Coley's fluid; and when the patient was seen, some months later, he had remained well.

Speaking of positive focal tuberculin reaction in sarcomata, it occurs to me that this might arise without the patient's having tuberculosis. I had never heard of it, and have found nothing in the literature about it; but Dr. Dunn, of Asheville, told me yesterday that he had seen a report of some cases by someone in Leipsic, that had positive tuberculin reactions in sarcoma.

Dr. Howard F. Hansell, Philadelphia. With reference to the statement of Dr. Woods concerning transillumination, I would say that I am quite in accord with him, and believe that the explanation of the mistakes made (and I believe that they are often made, when one depends too much on transillumination) is that they are sometimes due to the absence of pigment. The shadow is more likely to be cast when there is a great deal of pigment. I do not place much confidence in the value of transillumination as a diagnostic means.

Dr. Clark was correct in saying that I made the statement that early enucleation will not prevent metastasis. I looked up the authorities, tho I have not quoted any in my paper; and I found that they agree that forty to fifty per cent of tumors of the eyeball are metastatic, and that they quite agree that early enucleation will not prevent metastasis. It appears to me to be analogous to cases of syphilis, in which early excision of the primary sore will not prevent the general infection. These cases of tumor, however early discovered, must have existed long enough to permit of entrance of the germs, or whatever it may be that produces the growth, into the general system. I agree with all the speakers that early enucleation should be done; and that it is preferable, for fear metastasis may supervene. I believe that it is the best treatment, and is better than any treatment by which enucleation might be delayed. While the X-rays and radium may help to remove the tumor or to diminish it in size, the eye is usually blind and useless, and must be admitted to be a source of danger.

Dr. Dunbar Roy, Atlanta. While two or three cases are by no means a criterion on which to base a prognosis, I am convinced that when epibulbar epithelioma exists, and the diagnosis has been made clinically and microscopically, the best thing to do is to enucleate the eye and take all the suspected tissue possible, and then eviscerate the orbit in case the conjunctiva left is involved. I am convinced that you cannot remove radically an epibulbar epithelioma, and have it stand a chance of remaining cured without extension.

I am satisfied that where you can reach the growth, the electrocautery is one of the best instruments to be used in these cases. I have been using Coley's fluid in a number of cases, and have never found the slightest sign of improvement produced by it.

Paralysis of Accommodation Due to Focal Infections.

Dr. Clarence A. Veasey, Spokane, read the paper published in full on page 858.

Discussion.—Dr. H. F. Hansell, Philadelphia. A young man of thirty came to see me on account of not seeing well, and all that I was able to find wrong was myopia of a diopter and a half. I had him examined, and was told that he had diseased tonsils; and Dr. Lewis removed them. During the next six months, the myopia disappeared and vision became 6/6 without a glass and a concave glass made it worse.

Dr. Alexander Duane, New York. It has appeared to me that not the simple paralysis or paresis of accommodation, but the weakening of accommodation, accommodative asthenopia, must be frequently due to these focal infections. For a number of years, when I got a case of subnormal accommodation, I insisted on the nose being examined; because it has been my experience that this has been dependent on conditions of pressure within the nose, without, perhaps, any sinus infection. It has been surprising to see the effect that removal of that pressure would produce on the accommodative state.

It is only more recently that my attention has been called to other focal infections, particularly those of the tonsils and teeth, by one very striking case in which accommodative asthenopia occurred. The patient was a naval officer, whose refraction and motility had been gone over very carefully, and everything done in that regard. He had all sorts of tests made at the Naval Hospital without result, and went to the various specialists of New York without any benefit. The asthenopia continued, and he could not read at all. He was put on duty at the Bath Iron Works, in connection with naval construction. While there, he went to Boston; and, remembering that I had said that he should have a most thoro examination, he went to a specialist and had his teeth examined. Incidentally, a tonsilar infection was found. The tonsils were removed; and almost immediately, his asthenopia disappeared. That is one of the most striking cases; but it has been paralleled by others, not so remarkable.

Dr. Lucien Howe, Buffalo. If such an affection can cause a paralysis of accommodation, there is no reason why it should not act in some cases to effect a spasm of accommodation.

Dr. T. B. Holloway, Philadelphia. Dr. Veasey was good enough to refer to the case notes that I sent him three or four years ago. It is hardly fair to include this case as strictly one of focal infection. The patient was admitted to the hospital for a series of operations. He developed a violent streptococcic catgut infection, so exceptions could well be taken to including this as one of focal infection. When he came under my observation he had a paresis of accommodation. It was the first time that I had seen one of such a character, and I have been watching for similar cases since that time. In discussing this case with Dr. Apple, of Lancaster, he said that a case of throat infection had come under his observation in which repeated cultures had shown nothing but the streptococcus. He sent the patient to me, and I found that she had a paresis of accommodation. This case would also come under suspicion because she had other paralyses, which are recognized as frequently accompanying a diphtheritic infection.

In testing the accommodation of what are apparently true cases of involvement of accommodation as well as of supposed hysteria or malingering, I have found that it is of great service to measure the near point with a series of lenses instead of with possibly one lens. At the next visit no regular order is used in placing these lenses before the eye. This method has been of service to me on more than one occasion in distinguishing between a true paralytic and a functional condition. Doubtless many members of the Society may resort to the same test, but I do not recall having seen it mentioned.

Dr. Hiram Woods, Baltimore. Dr. Hansell's case suggests another form of possible focal irritation. The cases of Dr. Veasey are paralytic. The case of Dr. Hansell seems to be one of dynamic myopia produced by some irritation; and the disappearance of it after the discovery of the focal irritation points pretty clearly to the cause. Some years ago, Dr. Theobald, in a personal conversation, called my attention to another form of this thing. We were speaking of the class of cases in which there is a tremendous difficulty in getting a satisfactory cycloplegia. You begin with homatropin, and do not get anywhere; that is, in the subjective examination. The axis of a low grade of astigmatism will vary from 65° to 110°; and the longer you keep the patient under examination, the more uncertain he gets, and the more annoyed you get. Then you wait, and go on with your cycloplegics, using atropin or hyoscyamin; and it is several days before you can get anything like a satisfactory agreement between the objective measures and the subjective tests.

Dr. Theobald asked whether I had looked at the child's teeth. To make a long story short, there were two or three teeth that needed attention. This was done, one being extracted; and since then, I have found, or thought that I have found, an explanation for this very troublesome class of cases—cases in which the ciliary muscle will not relax promptly and definitely. I have seen it associated most frequently with dental irritation, but I believe that it can come from other forms of focal irritation, and it is simply a different class of irritation. One is an irritative one; and the other, paretic—or, at least, inhibitory.

Dr. J. P. Worrell, Terre Haute. Some years ago, I made on a young man, twenty-eight years of age, for iridocyclitis, an evisceration, instead of an enucleation. At the time he had rejected a plus glass. A few weeks ago, he came saying that he had difficulty in reading. His vision for distance was 20/20 minus. He accepted a +0.25, with which the vision came up to 20/15. With plus 2, his near point was eleven inches, but for a moment. The vision receded rapidly. His teeth, nose, accessory sinuses and tonsils were all thoroly investigated, and were entirely negative, except that he had two bad teeth, which I had removed. Three weeks were allowed to elapse and no improvement was noted. The stump was removed. When two weeks had elapsed since the operation, he had vision for distance to 20/15, and he declined plus 0.25, which he had used when I first saw him. With plus 2, his near point was still in the neighborhood of eleven inches, but he maintained his vision longer.

Dr. George E. de Schweinitz, Philadelphia. It is interesting, in relation to focal infections and disturbances of accommodation, to distinguish between those appearing rapidly and those that come, after the focal infection may have long existed. The rapid ones, we are all familiar with. This was exhibited in a case in which, after eating some food stuff, the patient, after a short time, acquired paresis of accommodation. I have no doubt that the food contained an excess of sugar. It seems to me, as Rosenow has shown, that the area of focal infection is a depot in which is manufactured some sort of diffusible toxin, which passes out to certain cells with which it has an affinity. This is analogous to the physiologic action of drugs. Dr. H. C. Wood used to say that the time would come when we should speak of the histologic action of drugs. It seems to me that we must believe that, in some way from these focal infections, different irritative stimuli go out—call them diffusible toxins, if you like that somewhat vague term. Sometimes this irritative stimulus or diffusible toxin selects one place; sometimes another; and sometimes, none. Sometimes it finds its affinity in some particular nerve or cell. That is why these focal infections may last a long time and nothing happen; and then they find an affinity, with the result of the condition described this morning.

Apparent Accommodation in the Lensless Eye.

Dr. A. Edward Davis, New York, read the paper published in full, page 860.

Discussion.—Dr. C. D. Wescott, Chicago. I think that Dr. Davis has said nothing about the condition of the capsule in these cases. I have one case under observation, and have had for many years, in which both lenses were involved in trauma. Traumatic cataract was finally absorbed by repeated needlings. But a hard, dense capsule remained, in which there was a vertical small oval opening. This patient required a plus ten with the correction of astigmatism for distant vision, and got 6/9. He could read Jaeger 1 comfortably without any addition. The explanation was the pin point pupil. I have had a case in which I made an extraction for cataract. The patient required plus 10. There was vision of about 20/25; and she read with perfect ease the newspaper without any addition. But in that case, the capsule was dense, with a central opening that appeared to be not more than a millimeter in diameter.

Dr. C. F. Clark, Columbus. Owing to the strictness of our Chairman, I was cut short before I had time to report one of the cases that illustrated my paper on Dislocation and Coloboma of the Lens. This is an eye with dislocation of the lens downward, coming on in a patient evidently congenitally affected, but as the result of a slight traumatism. This man with a plus 18 glass, read with perfect satisfaction, and has carried on his business for fifteen years with a plus 18 spherical and a slight correction of his corneal astigmatism; and has an excellent range of accommodation, 5/7 in one, and 5/6 in the other eye. He reads fine print. I reported this case to our State Society. Dr. Risley happened to be present at the meeting. He tried to account for it by the stenopaic opening. The patient has a very small pupil. Dr. Risley mentioned the improvement in vision produced by looking obliquely through a lens.

Dr. William Zentmayer, Philadelphia. About a year ago, before the College of Physicians of Philadelphia, I showed a girl on whom I had performed a linear extraction. She is now able to read Jaeger 1 at any distance with perfect facility. I used that case as a basis for reviewing the whole subject.

I think the statement of Donders was misinterpreted. What he meant was that accommodation, in the same sense that we usually employ this term, was not present in the eye. There are a number of explanations for the condition. Slight changes in the distance of the correcting lens from the eye, which enormously changes the focus of the lens, and many other explanations, have been given. It seems to me that the explanation of a stenopaic opening is the one that meets most of the cases.

Dr. William Tarun, Baltimore. I remember seeing recently a case of lensless eye in which the patient could read at ordinary reading distance with distance correction. He was fifty-five years of age, and had been operated on with a good visual result. He could read Jaeger 1 without any difficulty; and my colleagues thought that they had a case of accommodation in the affected eye. I said to the patient, "Open your eyes naturally." He did so; and I said "Now read." He said "I cannot see anything on the card."

There are probably several factors present in cases of this kind. Some patients have a deficient vision for distance, particularly myopes, who improve their vision by a certain squinting of the lids. There are presbyopes who can do the same thing without presbyopic correction.

Dr. J. A. White, Richmond, Va. I reported a case in 1897. The patient was a man forty-six years old. Examination showed two openings in the capsule. Two other patients were sisters of this man. Both were operated on. Both have the same ability. Both use the same lens for distance and reading. Both get 20/20. One has an opening in the capsule, but the other has a perfectly clear pupillary area; but still she has the same ability to interpret the dispersion circles. She can read a newspaper and get 20/20 vision at a distance.

This has changed my mind about the explanation regarding the interpretation of dispersion circles.

Dr. Herbert Harlan, Baltimore. After reading the abstract of Dr. Davis' paper, I found this case in my clinic. The patient is a young woman of twenty-five years with a black pupil on one side, and a dense white one on the other. She stated that 11 years ago, when she was fourteen years old, she had the left eye operated on for cataract. I asked her what she could do with the one operated on, and she said, "It is perfectly good. I can read with it." She had 15/50 without correction. She never had had correction. She remarked that she had read all Mark Twain's books without a glass. Then I began testing, and found 4.5 diopters of hyperopia. That improved her vision to 15/30 minus 1. The pupil was fairly sharp, about 4 mm. long, and 2 mm. wide at the widest part. The other eye, she said, had never been operated on. The pupil was filled with a dense white membrane. Three days later, I pulled out this very tough membrane. She immediately smiled and said, "How do you do, Doctor? I see you perfectly, as well as with the other eye." There is no doubt that this girl had 4½ diopters of hyperopia, and could read Jaeger No. 1, without any glass, at 8 inches.

Dr. Derrick T. Vail, Cincinnati. I should like to say something of accommodation of the lens to the lenseless eye. I have had a number of patients, wearing their full standard glass, who are able to read naturally. I have told them that all they need to do is to pull the frame slightly down, and they can read; and that if they wish to see off, they can pull the lens back. I have a large percentage—fifty per cent—who are enjoying the result of near vision by accommodating the lens to the eye. They can go into a library and look for a book, and do not have to look through a special glass. All they have to do is to pull the lens slightly down on their nose. In the same way, in a picture gallery, they can focus for an intermediate distance by just giving a slight movement to accommodate the lens to the eye. Some of these patients think that they have accommodation in the eye, but their accommodation is that of the lens to the eye.

Dr. W. E. Lambert, New York. I do not recall a case in adults in which this condition has been observed; but I do in young people, particularly in cases of congenitally dislocated lenses, and also in congenital cataracts. There is no question about these cases. I see them in greatest number in New York, and demonstrate them frequently at our clinic. The explanation of a stenopaic opening does not in all the cases explain the condition. There was in some a certain effort on the part of the patient to reduce the diffusion by the action of the lids on the cornea. It seems to me that the change may be due largely to the action of the extrinsic ocular muscles in producing a change in the axis of the globe, and possibly in the curvature of the cornea, increasing the convexity and giving the effect of an increased spherical refraction power.

Dr. Edward Jackson, Denver. To bring the discussion back towards Dr. Davis' paper, I want to mention a case that supports his view regarding the interpretation of images. Some years ago, I examined a man with about six diopters of myopia, who had the ordinary impairment of vision that goes with myopia, and improvement of vision when I put on glasses. In the course of the examination, it came out that he was quite a rifle shot; that he had made record scores, and had been a valuable member of rifle teams, shooting without any glasses. He could not bring his vision up to anywhere near normal by any manipulation of his lids. But in a strong light, out of doors, his pupils contracted decidedly; and he had learned to interpret his diffusion images of the target where most of us would not notice there was a target. Diffusion circles are often capable of more accurate interpretation than one who had not experienced them thru a long period would suppose possible.

These cases should be spoken of, however, as cases of ability to read without accommodation. Accommodation, since the time that Donders brought out his work, has had a definite meaning. These cases are not vision with accommodation but without accommodation, by means of compensatory devices or tricks.

Dr. A. Edward Davis, New York. Regarding the capsule in these cases, there was a capsule in each case, but a single opening. It was not stenopaic. In one case, there was no astigmatism; so it could not be due to the patient's using first one meridian, and then the other.

ABSTRACTS

E. Török. Tuberculin in Diagnosis and Treatment of Eye Diseases.—Archives of Ophthal., v. 48, p. 242.

Because there is tuberculosis somewhere in the body it does not follow that the eye condition is of the same origin. The demonstration of the tubercle bacillus is but rarely possible and the microscopic examination of excised diseased tissue is feasible only in some anterior affections. From a practical standpoint, the most important factors in making the diagnosis of a tuberculous affection of the eye are the clinical appearance of the eye and the tuberculin injections. Tuberculous affections are characterized by their chronic course, low inflammatory symptoms, and the appearance of small nodules (tubercles) in the affected tissues. The latter are of the greatest importance, their presence being almost positive proof of a tuberculous affection.

To confirm the diagnosis the resort is made to tuberculin. The Calmette reaction is mentioned only to be condemned; the von Pirquet test has its limitations and when positive gives no clew to the location of the tuberculous focus in the body.

The subcutaneous test is the most reliable. For this Török gives ½ mgm., 1 mgm. and 3 mgm. in children, and 1 mgm., 3 mgm. and 5 mgm. in adults. A local or general reaction simply means a focus exists somewhere in the body. The focal reaction is the most important and is the one which indicates that the tuberculous focus is in the eye. In those cases in which a local and general reaction is observed, the diagnosis of tuberculosis cannot be positively established. In such cases in which all other causes can be excluded, it is justifiable to consider the eye condition as of probable tuberculous origin. Török gives a resumé of 100 cases diagnosed and treated as tuberculous eye affections.

One of the outstanding facts was the length of treatment necessary; in many cases lasting a number of years. Another point was that the cases, not responding to treatment generally, did not show a focal reaction. This was particularly true of exudative choroiditis. Of eight such cases with no focal reaction, 5 had dental infection and all recovered under appropriate treatment. All of the 11 periphlebitis retinae cases showed a focal reaction and all recovered under tuberculin therapy. In a number of cases of scleritis and sclerosing keratitis not responding to tuberculin treatment, improvement was obtained by subconjunctival injections of guaiacol cacodylat as recommended by Darier. It was thought worth while to further consider this agent and to investigate its healing qualities in stubborn tuberculous eye conditions. Tuberculin injections are commenced with a 1/10,000 mgm. dose and gradually increased, dependent on the condition and the reaction of the patient, to a maximum of 1 mgm. All general reactions are avoided. The frequency of the injections is regulated partly by the amount given and partly by the action of the tuberculin upon the patient, of necessity varying with the individual. As a general rule Török gives two injections a week until 1/1000 mgm. is reached; once a week up to 1/100 mgm; once in two weeks up 1/10 mgm; and once a month up to 1 mgm. No hard and fast rules can be laid down as to the length of treatment, being again dependent on the individual. It is a matter of years, however, and not months. After apparent cure it is well to give an injection every 3 or 4 months, for years. The following conclusions were reached:

We consider an eye condition tuberculous only when a positive focal reaction has been observed.

In cases where, for some reason or other, a positive focal reaction cannot be obtained, but the patient shows a positive general and local reaction, and every other possible cause for the eye condition is, with reasonable certainty, excluded, we consider the case of probable tuberculous origin.

For diagnostic and therapeutic purposes, tuberculin should always be used in fresh solution, not over two weeks old.

For diagnosis in eye conditions, only the subcutaneous injection is of value. It can be used in children as well as in adults with practically no danger.

Tuberculin is a valuable remedy in ophthalmic therapeutics provided it is used in very small doses, in positive tuberculous eye affections, i. e. in eye affections where a positive focal reaction was obtained. Used under these conditions, there is no danger involved.

The treatment should be started with a very small dose—1/10,000 mgm., increasing it slowly to the maximum dose that the patient can tolerate, which in no case should exceed 1 mgm. During treatment all reactions should be avoided.

Duration of treatment should be long. Relapses being frequent in those cases where treatment has been discontinued after an apparent cure following treatment of less than eight months.

Best results have been obtained in those cases where treatment was continued for several years, and in which, after the apparent cure, an injection of the maximum dose was given once every three or four months.

Tuberculin is of least value in chronic uveitis cases, with the exception of heterochromic cyclitis; while in the cases of scleritis and periphlebitis retinae the tuberculin treatment is most satisfactory.

Scleritis, deep and interstitial keratitis, and iridocyclitis are closely related to each other and have not a separate entity, but may change from one condition to the other, a clinical observation which is borne out by the pathologic findings of Treacher Collins.

Exudative choroiditis cases are seldom of tuberculous origin, the source of infection often being the teeth.

W. F. H.

Mas Soewarno. Forms of Iris Depigmentation.—(Doctorate Thesis.)

Soewarno deals first with the different types of iris pigment in man, with the structure of the iris tissue and the pigment distribution, with the kinds of pigment as regards form, chemism and physiologic action and the relation in different race.

Numerous substances, which fluoresce, are capable of producing inflammations, which in albinotic animals exposed to light can go on to necrosis. The extraretinal ocular pigment of a very dark rabbit was sufficient protection against the light of a mercury lamp for 15 minutes, at 50 c.m. distance. An albinotic rabbit developed at that distance after 5 minutes a rather serious conjunctivitis, which required six days to cure. Greater differences occurred if a 1 per cent eosin-solution 1 c.m. was injected intravenously daily for a week or still greater if the animals were nourished with food stained with eosin for at least two weeks. In the dark "control" rabbit as well as in the albino the eosin injections produced a condition of photosensibility. The reaction in the dark animal was limited to a slight conjunctival redness, after 15 minutes illumination at 50 c.m. which returned to normal after four days. The albino under similar circumstances developed a serious inflammation of the conjunctiva, much opacity of the cornea and hyperemia of the iris; and after the acute disturbances had subsided a cataract was discovered which had not existed before the exposure. The reaction to the illumination was still stronger in rabbits, which had been fed with colored oats. With the other acute symptoms, hemorrhages in the conjunctiva and iris (in one rabbit also in the retina) appeared. The iris color became a dirty grayish red, and the pupil narrow, so that in these animals an acute hemorrhagic iritis developed.

Tyrosinase has not been demonstarted in the higher animals. The opinion of Nettleship and Usher, which would explain the absence of pigment in albinos through the trysoinase theory, does not rest on facts. Bloch could demonstrate the presence of a ferment in the human skin, connected with pigmentation, by bringing the skin into contact for 24 hours with dioxyphenylalanin. Where pigment is present, the reagent which was in the beginning colorless becomes transformed into an insoluble melanin-like black product. This ferment Bloch calls dopaoxydase, being the ferment which dioxyphenylalanin (in short: "dopa") oxydises. No investigations of the functions of ferments in the development of ocular pigment have been made. A few experiments made with pieces of the irides of rabbits prove that the dioxyphenylalanin reacts upon the iris stroma, as upon the skin. The piece of iris should be embedded in thick (10-20%) solution of gelatin, which has been neutralized with a 10 per cent solution of Na_2Co_3. However, sections can be improved upon, as good findings were got with the usual way of teasing. The writer accepts the theory, which explains the origin of the pigment through the action of a ferment.

In the second part Soewarno takes up the albinotic iris, heterochromia iridis, circumscribed depigmentations of the iris, glaucomatous iris depigmentation and depigmentations of the iris thru general diseases. A piece of an *albinotic iris* of a rabbit was treated according to the methods of Bloch and Ryniher with the "dopa"; and it was found that the iris stroma reacts to the reagents in the same way as to the control fluid (physiologic salt solution); that the stroma cells do not become stained thru the "dopa." It seems therefore that the cause of the albinotic iris must be found in the absence of the ferment of Bloch.

HETEROCHROMIA IRIDIS.

To verify Angelucci's statement of a direct connection between the sympathetic and iris coloration Soewarno extirpated the superior ganglion in three young rabbits, but did not see any difference in the color of the eyes after nine months.

The accepted, but partly contradictory, viewpoints regarding the pathogenesis of the unilateral, total depigmentation of the iris, and especially the question why in one case it is accompanied by complications and not in the other, lead to the study of heterochromia. From April, 1918, to December, 29 cases were examined in the Amsterdam Policlinic, partly with the help of the school physicians. The youngest patient was four years, the oldest nearly 70. Twelve of these were children of the elementary school. Among these four complications were found. Among the other 17, mostly adults, 15 had, besides iris depigmentation, some other pathologic change in the eye. The history often gave different colored eyes for the two parents.

The general condition of the patients was good, in only three cases did some indication exist for a general examination, which, however, did not demonstrate anything. In two cases the darker eye was the pathologic one. In No. 7 the cyclitis symptoms and the cataract were more pronounced in the darker eye; and in No. 29 the light eye was healthy, and the one with darker pigment showed Descemet's spots and vitreous changes. The writer accepts the idea of a double heterochromia and also a heterochromia iridis sine heterochromia.

Two types can be distinguished in the clinical appearance of the anterior surface of the iris. In the first the iris is, with the exception of the color, entirely like that of a normal similarly colored eye. The second type, which is generally considered typical, has a less moist iris surface, is less glossy, the relief is less distinct because the connective tissue bundles and bloodvessels are less prominent, in its totality it gives the impression of a very slight atrophy of the iris tissue. Of those examined, 11 belonged to the first type, the remaining 18 to the second type.

The Descemet spots retain a certain individuality in spite of their long existence. In one case the numerous precipitates could hardly be found after cataract extraction; they must have been washed away by the aqueous.

The iris in sympathetic heterochromia belongs to the first type, altho experimentally it has not yet been proven that removal of the sympathetic influence produces disturbances in the iris pigmentation, many clinical observations point to such a connection. However, one must be careful when only one symptom is present, and one must also accept the fact that removal of the sympathetic is not always sufficient to produce heterochromia and that probably other unknown causes exist. In this direction point the numerous sympathetic paralyses not associated with iris depigmentation. Perhaps climatic influences are present.

Soewarno cannot accept Fuch's opinion of a common cause for the depigmentation and the cyclitis, as it seems improbable, that one and the same agent should cause the stroma pigment to disappear in the period of development, should remain quiescent for a long time and much later should produce a cyclitis. It seems as if the cause has been too often sought in the organism itself, while external causes have been disregarded. The results of the investigations regarding changes and injuries to the eye by light rays should help our insight into the cause of heterochromia.

In a rabbit exposed for 15 minutes to a mercury vapor lamp (distance 50 c.m.) fine dust-like opacities appeared in the posterior cortex of the lens. The pigmentation of the iris in rabbits can be influenced by the mercury vapor lamp in two ways, namely, thru low dosage which causes hyperpigmentation, especially in the peripheric zone and pupillary margin, and then longer exposure at a shorter distance, which produces depigmentation. It is found that unpigmented rabbit eyes are much more sensitive to ultraviolet rays than strongly pigmented ones.

The pigment epithelium of iris and ciliary processes can be damaged by the diffusely dispersed light rays in the lens; which may, according to van der Hoeve, produce cataract. If the light which reaches the ciliary body along this indirect route, can menace this organ with disease, the more direct contact of light rays, which can be expected thru pigment-free irides, must be still more harmful. Perhaps the absence of pigment in the eye can produce a photosensibility. Once the ciliary body is suffering, it will not be long before the lens also is affected. The one-sided blue eye is contrary to both blue eyes, and congenitally of lower value. But because a part of the blue eyes in heterochromia are a physiologic heredity, they are not followed by symptoms of iridocyclitis.

Circumscribed depigmentations of the iris. Axenfeld described in 1911 a depigmentation of the visible part of the retinal layer of iris. Soewarno notes its frequent coincidence with cataract. He found it also in eyes with developed incipient cataract. He considers that they are not simple blue or gray eyes, but that the gray color of these eyes must be considered as a pathologic phenomenon.

Glaucomatous iris depigmentation. The conclusion is reached there is more evidence against Koeppe's theory than in its favor, and that the pigment changes of primary glaucoma must rather be considered the consequences of the pathologic pressure. An interesting finding is a peculiar nacre-gray discoloration of the pupillary margin located exclusively in the pupillary zone. It often begins on both sides of an artificial iris coloboma in the ciliary margin, goes parallel with the coloboma towards or to the pupil. Sometimes it is found in the region of the sphincter iridis. The discolored strips have sharp limits, are often a few millimeters broad and contain much pigment dust. The normal iris relief has been destroyed thruout these strips, altho on a careful inspection remnants of vessels are often distinguished. They resemble the small circumscribed spots of variola-vitiligo, and also the discoloration of an iridodialysis.

These distinct atrophies and mother-of-pearl discolorations appear after acute glaucoma, operated or not, some weeks or months after serious attacks, and are apparently the result of something acting during the attack on the iris, or its vessels or nerves and not of the pressure itself.

Depigmentations of the iris consequent upon general diseases. Four diabetic patients did not show any pigment disturbances. Among 169 female and 107 male luetic patients, 29 showed more or less distinct changes in the iris, 23 being females. The phenomenon of depigmentation could be followed in its entirety in 7 persons. Often without subjective complaints or objectively observable signs, small gray, gray-white or yellow-white foci, of pinhead size appear in the anterior surface of the iris, which enlarge often excentrically. They may coalesce, forming maplike fields, or normal iris tissue may remain between them. On the depigmented parts, their borders and around them fine pigment is often seen. The place of predilection is the ciliary zone. As a rule the white spots appear in both eyes. The bloodvessels appear as naked lines, best seen in light-brown and brown eyes. They cannot with certainty be recognized in totally gray or blue irides because of the absence of contrast. Krückmann has described this condition as leukiridia or leukopathia iridis. This syphilitic leukiridia appears between 3 months and 2 years. In the 7 patients where the entire cycle could be followed the average duration was about 5 months. Its frequency is twice as great among females as males. Light cannot be influential, as the greatest number was found among people, who are much indoors. The age of these patients was from 17 to above 40, half of the cases were between 20 and 30 years. In the great majority of cases the white spots were seen in the secondary period of syphilis. They appeared when most of the cutaneous eruptions had vanished. Never is it stated that iris roseola or even local hyperemia preceded. Among these 29 cases, in 17 a syphilitic leucoderma was found. These two conditions should be regarded as equivalent. Inflammatory symptoms are never seen in this condition, so that the treponema cannot be the direct cause. They may be caused by impoverished blood supply, the result of the general disease. It seems plausible, that the difference in sex explains the more frequent affection among women (Van Dar Kaaden).

E. E. B.

American Journal of Ophthalmology

Series 3, Vol. 2, No. 12 December, 1919

PUBLISHED MONTHLY BY THE OPHTHALMIC PUBLISHING COMPANY

EDITORIAL STAFF

ADOLF ALT,
Metropolitan Bldg., St. Louis, Mo.
M. URIBE-TRONCOSO,
143 W. 92nd St., New York City.
MEYER WIENER,
Carleton Bldg., St. Louis, Mo.
CASEY A. WOOD,
7 W. Madison St., Chicago, Ill.
HARRY V. WÜRDEMANN,
Cobb Bldg., Seattle, Washington.
EDWARD JACKSON, Editor,
318 Majestic Bldg., Denver, Colo.
CLARENCE LOEB, *Associate Editor,*
25 E. Washington St., Chicago, Ill.

Original papers and books for review may be sent to any member of the editorial staff Reports of society proceedings, correspondence, and other scientific communications should be addressed to the Editor.

Proof should be corrected and returned within forty-eight hours to the printer. Reprints may be obtained from the printers, Tucker-Kenworthy Co., 501 S. La Salle St., Chicago, Ill., if ordered at the time proofs are returned.

Subscriptions, applications for single copies, communications with reference to advertising or other business, should be addressed to

H. A. FOX, Manager, 7 West Madison St., Chicago, Ill.

OPTICAL ASPECTS OF PRINTING MAGAZINES FROM TYPEWRITER COPY

The strike of the printers has greatly interfered with publications, more particularly the weekly and monthly popular, trade and scientific magazines, some of which suspended publication.

The Literary Digest, one of the scores of periodicals forced to suspend typesetting by the lockout and strike in the local printers' trade, was the forerunner in a new method of printing directly from photo-tint plates from typewritten copy. This has been followed by Nugent's Weekly, a trade magazine, devoted to the manufacture of women's garments; the latter making the announcement that publication would be maintained by the same process every week until the strike is ended. The Literary Digest had all of its body matter reproduced in two columns as usual, the type reduced to about the same size as the regular type i. e. as small pica. The trade magazine used the same process of typewriting and photography, but by the use of a special typewriter, the lines were "justified" or equalized in length, an improvement on its literary confrêre.

On reading these journals, the editor has noticed a difference in the legibility or rather the ease of reading from that of ordinary typesetting or the linotype printing, which is certainly not in favor of this temporary makeshift for publication. This reason lies largely in the difficulty of instantaneous recognition of the word symbols made up of letters. It goes without saying that we do not spell our words in ordinary reading; that the whole word, i. e. all the letters are taken in at a glance and form a word picture; but the clearer the definition of each letter, the more easily is the word picture recognized.

It is only those who have had great experience in reading, and particularly in proof reading, who detect at a glance individual letters which are errors in spelling or punctuation. The easiest face of type to read has been found purely from empiric use. It is a type in which the vertical lines are more accentuated than the horizontals; i. e., the ordinary modified Roman type with its many varieties. For ordinary typewriting, this form is not used; but we have a modified block letter, its horizontal constituents being of the same or about the same weight as the verticals. In the large sized type of the type writer, as well as those used for headings, advertisements, etc., this style would be readily read, but when put in a mass as in close lined typewriting, or full page, it is not so legible and when reduced in size to small pica or brevier, the eye does not recognize the unaccustomed word symbols so quickly or so easily and hence a feeling of fatigue results.

Then again the typewritten copy, if magnified will be seen not to have the clear definition of the lead type print; the result of which is a slightly blurred image which requires more of a mental as well as more of an ocular effort, not alone the retinal and cerebral perception but likewise the muscular sense: The latter is certainly more on account of the eyes having to move to and fro more in reading typewriter copy, or a reproduction, than is necessary in lead type prints.

Certainly a large economic saving, resulting in cutting out of the linotype and hand setting operators, the expensive machinery and materials, might be made by this form of book work: for the reproduction by photography by the methods of zinc etchings, et cetera, is much cheaper than hand or machinery work.

If however, clear copy in the form of type to which we are accustomed be given to the photo engraver, there is no doubt that a satisfactory, easily read page may be made, and this innovation bids to become a fair competitor to the ancient and accustomed process of bookmaking now in vogue.

H. V. W.

THE CONGRESS ON OPHTHALMOLOGY.

The Committee to plan and arrange for a World Congress of Ophthalmology has now been named and has begun its work. The last three of its members were appointed at the Cleveland meeting, and a week later the joint committee held its meeting for organization in New York City. It consists of:

George E. de Schweinitz, Chairman, Philadelphia.
Luther C. Peter, Secretary, Phila.
Lucien Howe, Buffalo.
William H. Wilder, Chicago.
William H. Wilmer, Washington.
Walter B. Lancaster, Boston.
Edward Jackson, Denver.
Fred Tooke, Montreal, Canada.
Francisco M. Fernandez, Havana, Cuba.

This committee is broadly representative. Three members were named by the Section of Ophthalmology of the American Medical Association, three by the American Ophthalmological Society, and three by the American Academy of Ophthalmology and Oto-Laryngology. It was a happy thought to include representatives of the profession of Canada and Cuba. For a committee chosen in this way different sections of the country are fairly represented, with a concentration in Eastern cities that will facilitate getting together and prompt action. However, it will be necessary for this committee at an early date to form a representative American committee, as it will be necessary to get committees to represent the movement in other countries.

A first step toward preparation for the congress will be the selection of the time and place for holding it. But these can scarcely be fixed until the situation has been considered, and European and other confreres consulted as to their best season for attendance. Meanwhile American ophthalmologists ought to begin to prepare for the entertainment of their visitors both as scientific men and as tourists.

In the coming Congress the United States should supply a larger share of the scientific program than in any preceding gathering of the kind. Not only is the number of ophthalmologists practising in this country larger than ever before, and larger than in any other country, in many ways they are more generally organized and in touch with one another. Their hospitals, out-patient services, and teaching facilities altho still far from adequate are better than they have been in the past. Worthy papers and well prepared speakers in discussion should be forthcoming in sufficient number to give our guests a favorable impression of American ophthalmology. This preparation for a feast of scientific observations will require the longest, the most widely distributed preparation. It ought to begin now.

So far as possible we want our visitors to get acquainted with North America. Where there are medical and ophthalmic institutions to show, these should be put in order and brought to the highest state of efficiency, by way of preparation. Where there are scenery, natural resources or curiosities of nature to be exploited the local ophthalmologists should prepare to offer every assistance to those foreign guests who may be interested in them. There is time between now and the holding of the Congress for one to acquire some speaking facility in either of the languages likely to be official in the Congress, English, French and Spanish. But the sooner we get about such preparations, the better will be the result. E. J.

OUR SECOND YEAR.

Altho the past year has been one of especial difficulties of publication, the American Journal has come thru it without losing ground, and has made some substantial gains.

It has gained in the number of subscribers, both in the United States, and especially outside this country in all quarters of the globe. It has gained in the assistance of new collaborators and in the increased activity of some already on our list.

In a year when many of the prominent magazines of America like the Century and Collier's have been forced to suspend; it has been issued each month, and has suffered no deterioration in paper or typography. It has been able to publish more colored plates and some of these have reached the highest standards of excellence in color reproduction. It has done this, and yet maintained its cash reserve, and met the increased cost of all materials and labor.

It comes to the new year better organized, better supported, with a better class of articles ready to fill its pages, with better command of the world's literature of ophthalmology than it has ever had before. Modifications will appear in the coming issues, which represent a better understanding of the needs of our subscribers. The Journal has been made and will be kept something that no progressive English speaking ophthalmologist can afford to do without.

INDEXES.

The various indexes, to this Journal and its year book supplement, occupy a large part of this number. As last year the indexes for the Journal are at the beginning and those for the year book supplement at the end of the issue.

In each case there is a name index and a subject index. The name index for the year book replaces the bibliography; which this year has been published from month to month for convenience in connection with the sections to which the various parts belong.

A glance over one of these indexes gives some indication of the amount of literature relating to ophthalmology; that is thus opened up to the student of any particular condition or procedure. The explanation appended to the year book is designed to help those unfamiliar with it to the method of using this as a work of reference.

BOOK NOTICES

The American Encyclopedia and Dictionary of Ophthalmology. Edited by Dr. Casey A. Wood, M.R.C., U. S. A., assisted by a large staff of collaborators. Fully illustrated, Volume XV, Chicago; Cleveland Press, 1919.

Volume XV carries the work from "Retina, Detachment of" to "Solution, Carrel-Dakin." Doubtless the editor begins to see the finish of his gigantic task; and his readers can begin to appreciate the value of a library of ophthalmology always alphabetically arranged for immediate use. Imagine for comparison any fifteen volumes of the literature of ophthalmology, or better any 12,000 pages which might well constitute 25 or 30 volumes of ordinary size. Consider the duplication such a collection would represent, the confusion, the uncertainty of where to look for anything in such a miscellaneous collection, the years that it would have to be studied before its possessor could command its resources.

In contrast with such a collection the Encyclopedia is not free from duplication, requires some familiarity with its contents before one has them at command. But how enormously better the command the reader has at the start, and how much sooner can he make available the unrivalled collection of facts relating to our specialty that it contains.

The first topic considered in this volume is one which immediately arrests the attention of the practical ophthalmologist; and it receives attention commensurate therewith. The 65 pages devoted to detachment of the retina seem to have been written by Dr. Wood. The section is opened by a sort of table of contents filling two-thirds of a page; which will be a great help to the reader who uses the volumes as a work of reference. Beginning with a historical review of the subject the article seems intended to end with a summary of treatment. But to the latter has been appended an abstract of an important article by Birch-Hirschfeld appearing during the current year. Among the illustrations is the colored plate from the July number of this journal, illustrating both the article and the strenuous effort that has been made to bring the work up to date.

The other long articles in this number are upon Serology, 34 pages, Dynamic Skiametry, 105 pages, and Skiascopy, 57 pages. The one on Serology seems to be by the editor, and constitutes a very valuable aid to the ophthalmologist who wishes to make himself familiar with this new field in medicine.

The article on "Skiametry" by C. S. Sheard may justify its length more by its novelty to the ophthalmologist than by its permanent relative importance. In a general way it is an aspect of skiascopy that has been neglected by the oculist and exploited by the optometrist. The claims made for it have some foundation, but will not appeal very strongly to men trained in general physiology and pathology. The introduction of case details into an encyclopedia article might be adversely criticised. But it undertakes to carry over into practice the theoretic facts of relative occommodation; and on the whole may be found most profitable reading as new matter. On the other hand the article on skiascopy contains almost nothing that has not previously appeared in the literature on the subject, it is a summary of what has been previously worked out.

There are many other sections in this volume that will be of interest to the ophthalmic practitioner such as: Retina, Injuries of; Retinitis Albuminurica, Exudative, Pigmentosa, etc.; Retrobulbar Neuritis; Rupture of the Eyeball; Salvarsan; Sarcoma; School Hygiene; Siderosis; and many others. The new subscriber to the Encyclopedia will have the advantage of being sure of a completed work and of receiving it at an early date. It is now evident that this is the proper foundation for any working library of ophthalmology.

E. J.

American Encyclopedia, Volume XV.

Truly a complete book is given on the retina, embracing nearly two-hundred pages, the principal part written by Wood and "Injuries of" by Würdemann, of course with abstracts from many other authors.

The section on Serology probably by the editor, Casey Wood, is quite complete; that on Skiametry, Dynamic is certainly complete, and that on Skiascopy by Edward Jackson is a condensed but clear and complete exposition on the subject. Advantage has been taken to bring the subject up to date under subsidiary titles such as additional matter under sarcoma of the choroid; the main description of which is published under "Choroid-Sarcoma."

On the whole this volume keeps up the high class of its contents, and shows the controlling mind of its principal editor, Casey A. Wood. Certainly the series makes an exhaustive treatise on ophthalmology and one from which the practice and application of scientific medicine may be safely drawn. H. V. W.

CORRESPONDENCE.

ACRIFLAVINE AS A STAIN FOR CORNEAL ULCERS

To the Editor: Considerable interest has recently been manifested in the therapeutic properties of some of the acridine dyes. Most of these derivatives have no amebicidal properties. One of them, however, known as "Acriflavine," is claimed to possess high antiseptic power. It is derived from a coal tar base. If this claim is substantiated by further investigation, its value and desirablilty as a stain for corneal ulcers is apparent.

In order to determine its staining power I recently had a quantity made up of two per cent strength in normal salt solution, and used it just as fluorescein is used for this purpose. A single drop on the upper part of the eyeball was allowed to flow down the ulcer, the eye kept closed for about two minutes and then the eye and conjunctival sac thoroly irrigated with warm boric solution.

The result has been uniformly satisfactory in the few cases in which I have been able to try it. The stain is a bright emerald green. Its freedom from toxic properties, and the absence of any irritation to the cornea or conjunctival membrane, would make it appear that in this preparation we have a valuable addition for our use in ocular therapeutics.

Proflavine is a substance having similar properties, but its antiseptic power is not as great as that of Acriflavine.

CHAS. P. SMALL.

INVERSE ASTIGMATISM AND ASTHENOPIA.

To the Editor: Under the caption, "Observations on Astimatism" by John Green, Jr., and William F. Hardy (January issue of the "Journal," page 64) I note the following:

"One of the reasons for the greater degree of asthenopia in eyes with inverse astigmatism is the greater interference with the legibility of ordinary printed type. In direct astigmatism the vertical components of letters are distinct, whereas the opposite is the case in inverse astigmatism. Letters with vertical components distinct are more easily recognized than those with horizontal components distinct."

As the authors base many of their conclusions upon the above statements, it is obvious that if their premises are incorrect their views require substantial revision.

Is it true that in all instances, or even in the majority of cases, of direct astigmatism, the vertical components of letters are distinct? When one recalls the physiologic optics of the principal dioptric meridians of the eye, namely, that the vertical meridian is used for seeing the horizontal aspect of the object looked at, while the horizontal meridian deals with the vertical aspect of the object, it is evident that if the horizontal meridian is at fault (as obtains in direct hyperopic astigmia) the vertical components of the object are less distinct than any other part of it and, consequently, less clearly perceived; while in reverse hyperopic astigmia (where the vertical meridian is subnormal) the vertical parts of the object are more easily seen than the horizontal parts and consequently the object is more readily recognized, the very reverse of what the authors assert. One can quickly convince himself of this by simply placing before one eye (the other being closed) a minus two cylinder axis 90 degrees, which renders his refraction that of direct hyperopic astigmia; and he will observe that under these circumstances, when, looking at Snellen's test type for distance, or Jaeger's for near, his vision is much more impaired then if the same glass is put before his eye axis 180 degrees (which makes the eye inversely astigmatic). The author's reasoning is sound when the case is one of myopic astigmia, but when applied to hyperopic astigmia, it runs counter to well known principles of physiologic optics.

JOHN H. BAILEY.

Brooklyn, N. Y.

[The meridian seen most distinctly will depend on the exertion or relaxation of the accommodation. It would be worth while to observe and record the actual facts regarding these cases, to ascertain when inverse astigmatism does cause greater asthenopia, and when it does not.—Ed.]

NATURAL HISTORY OF CATARACT.

To the Editor: The undersigned would like to announce that 1,200 return postal cards, like the following, have been sent out.

"I am preparing a paper on the Natural History of Cataract. I hope to show what per cent of untreated lens opacities disappear, remain stationary or increase. Should a suficient number submit data such a table would be useful in determining by comparison the value of different therapeutic measures. If your reply shows that you have any available statistics, which you are willing to contribue, a more detailed questionnaire will be submitted.

Reply Card.

"Do you always treat incipient cataract?

"Have you records of any number of untreated cases?

"Do you make sketch of opacity as well as test vision?

"Are you willing to co-operate?"

Anyone who failed to receive one of these postal cards, and wishes to cooperate, please send his name and adress to Hotel Westminster.

DR. DAVID W. WELLS.

Boston, Mass.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C. Volunteers are needed in other localities.

DEATHS.

Clinton Brotemarkle, Salisbury, Md., aged 59, died in a sanatorium in Philadelphia, about October 23rd.

Stephen O. Richey, Washington, D. C., aged 70, a member of the American Opthalmological Society, died at his home, October 8th, from cerebral hemorrhage.

James F. Smith, New York City, aged 62, died at his home October 18th, from pneumonia. He was assistant surgeon of the eye department of the Manhattan and a member of the staff of the Post-Graduate Nose and Throat Hospital.

Charles F. Sterling, Warrenton, Virginia, aged 73, once professor of the eye and ear, University of Michigan, died October 28th from cerebral hemorrhage.

Francis Valk, of New York City, aged 74, died in St. Luke's Hospital, November 5th. Dr. Valk was a noted author and teacher, for many years Professor of Ophthalmology in the New York Post-Graduate School.

PERSONALS.

Drs. Cyril Barnert and David Newman, of New York City, have returned from service.

Dr. William M. Bane and Miss Elisebeth N. Evans, both of Denver, were married on the evening of October 8th.

Dr. Frank R. Spencer, of Boulder, was elected president of the Colorado State Medical Society at its last annual meeting.

Dr. A. C. Bartholomew announces his return to civil practice with offices in the Home Guards Temple, Van Wert, Ohio.

Mr. and Mrs. Henry Sahlein, of San Francisco, announce the marriage of their daughter, Rose Winifred, to Dr. Louis D. Green, of San Francisco, on October thirtieth.

Dr. Edward Jackson, of Denver, after forty years of active practice in ophthalmology, announces that hereafter he will confine his practice to consultation and diagnosis, including measurment of ametropia.

At a recent meeting of the Board of Regents of the University of Minnesota, Dr. William R. Murray, of Minneapolis, was appointed professor and chief of the department of Ophthalmology and Oto-Laryngology to fill the vacancy created by the death of Dr. Frank C. Todd.

Dr. William A. Sedwick, of Denver, went into the service October 11, 1917, as a lieutenant, and was discharged October 3, 1919, as a captain. During this time he served at Oglethorpe, Camp Grant, U. S. General Hospital No. 12, Baltimore, and Fort Thomas, Kentucky.

Dr. L. G. Dunlap has recently been released from the service after twelve months' service as chief of eye, ear, nose and throat, at the U. S. Army General Hospital, No. 25, Fort Benjamin Harrison, Indiana. He has now located at Anaconda, Montana.

Dr. Ralph A. Fenton, late Senior Consultant in Ophthalmology with the American Army of Occupation, and during active operations, ophthalmic surgeon with Evacuation Hospital No. 1, Toul sector, reviewed the special service of the American front and the Army of Occupation before the Portland Oto-Ophthalmological Society on October 20th.

Dr. Howard Ford Hansell has resigned his position as Ophthalmic Surgeon to the Philadelphia General Hospital, after a continuous and valued service of over twenty years. Dr. Hansell will continue his work as Professor of Ophthalmology at Jefferson Medical College.

Dr. C. E. G. Shannon has been appointed visiting Ophthalmic Surgeon to the Philadelphia General Hospital, to fill the vacancy on the staff caused by Dr. Hansell's resignation. Dr. Shannon has been associated with Dr. Hansell's services for some years, both at the Jefferson Medical College and the Philadelphia General Hospital.

Dr. Samuel D. Risley, of Philadelphia, will address, by invitation, the Buffalo Ophthalmic Club on the afternoon of November 19th, upon the subject "Asthenopia—a Problem of Binocular Vision," and on the eve of the same day he will address the Academy of Medicine of Buffalo upon "Disease of the Uveal Tract and its Relation to Systemic Affections." During Dr. Risley's stay in Buffalo he will be the guest of Dr. F. Park Lewis.

SOCIETIES.

The meetings of the Société d'Ophtalmologie de Paris, November 16th, was the thirtieth anniversary of its foundation. Discussion of a paper on "Circulation in the Retina in Health and Disease" was opened by Dr. Bailliart.

Dr. Harry S. Gradle, of Chicago, gave a talk before the Minnesota Academy of Ophthalmology and Oto-Laryngology, on the "Indications for Operative Treatment of the Various Types of Glaucoma," and Dr. E. J. Brown exhibited his new tonometer.

The Minnesota Academy of Ophthalmology and Oto-Laryngology, held its annual meeting at the Town and Country Club, St. Paul, October tenth, and elected the following officers: Dr. J. S. White, president; Dr. J. S Macnie, vice president, and Dr. John Morse, secretary.

On November 17th, in the Section on Ophthalmology of the New York Academy of Medicine, Dr. H. H. Janeway, presented a paper on "The Therapeutic use of Radium in Ophthalmology," based on his experience at the Memorial Hospital. Dr. J. H. Claiborne presented a paper on "Retinal Hemorrhage from Intestinal Intoxication with Complete Recovery."

The October reception of the Philadelphia Medical Club, was held at the Bellevue Stratford Hotel, on the evening of the 17th. The guest of honor was the Hon. William C. Sproul, Governor of Pennsylvania, Addresses were made by Governor Sproul, William I. Schaffer, Attorney General of Pennsylvania, and Hon. J. Hampton Moore, Mayor of Philadelphia. The reception was preceded by a dinner at the Union League in honor of Governor Sproul by the President of the Club, G. Oram Ring.

At the twenty-fourth annual meeting of the American Academy of Ophthalmology and Oto-Laryngology held in Cleveland, Ohio, October 16, 17, 18, 1919, the following officers were elected for the year 1920: President, Dr. Lee Masten Francis, Buffalo, N. Y.; First Vice-President, Dr. Hal Foster, Kansas City, Mo.; Second Vice-President, Dr. William E. Bruner, Cleveland, Ohio; Third Vice-President, Dr. Robert E. Lynch, New Orleans, La.; Treasurer, Dr. Secord H. Large, Cleveland, Ohio; Secretary, Dr. Luther C. Peter, Philadelphia, Pa.; Editor of Transactions, Dr. Clarence Loeb, Chicago, Ill.; Members of the Council, Dr. W. P. Wherry, Omaha, Neb., Dr. H. S. Gradle, Chicago, Ill.; Necrologist, Dr. Joseph C. Beck, Chicago, Ill.; Committee on Exhibits, Dr. Joseph Lichtenberg, Kansas City, Mo.

OPHTHALMIC LITERATURE

These lists contain the titles of all papers bearing on Ophthalmology received within the preceeding month. These titles are all in English, some of them modified to indicate more clearly their subjects. These subjects are grouped under appropriate heads, the succession of groups being the same from month to month. In the group the papers are arranged alphabetically usually by the name of the author in heavy-face type. After the subject of the paper (Ill.) indicates the number of illustrations. (Pl.) the number of plates, and (Col. pl.) colored plates illustrating the article. (Abst.) shows that it is an abstract of the original article. (Bibl.) tells that the paper is accompanied by an important bibliography. (Dis.) means that a discussion of the subject is published with it. Under Repeated Titles are indicated additional publication of papers already noticed. To secure the earliest possible notice writers may send copies of their papers, or reprints, to 318 Majestic Bldg., Denver, Colorado.

DIAGNOSIS.

Darier, A. Recent Progress in Ophthalmoloscopy. (Bibl., 3 ill.) Clin. Opht., 23, pp. 497-514.

Hartridge, G. The Ophthalmoscope. London, 6th Edition, 12 mo., 160 pages, 6 ill., 4 pl., Philadelphia, P. Blakiston's Sons and Co., Amer. Jour. Ophth., v. 2, p. 678.

Howard, H. J. Test for the Judgment of Distance. (Dis.) Amer. Jour. Ophth., v. 2, p. 755.

Lancaster, W. B. Research Work of the Air Service. Amer. Jour. Ophth., v. 2, p. 755.

Snellen, H. Visual Acuity as Measure of Function of the Retina. (Dis.) Amer. Jour. Ophth., v. 2, pp. 750-751.

Standards of Vision. Brit. Jour. Ophth., v. 3, p. 510.

Weve, H. Instrument for Examination of Hemianopic Pupillary Reaction, to be Attached to a Corneal Microscope. Amer. Jour. Ophth., v. 2, p. 749.

Wilmer, W. H. Vision of Aviators. Amer. Jour. Ophth., v. 2, pp. 753-755 and 758.

THERAPEUTICS.

Carreras, B. Injections of Milk in Ocular Affections. Los Prog. de la Clin., v. 7, p. 71.

Harris, S. J. Electrotherapy in Ophthalmology. Amer. Jour. Electrotherap. and Radiol., 38 p. 247.

Nakamura and Myake. Action of Adrenalin on the Retina. Nippon Gank. Zasshi. Feb., 1919.

Nakamura and Mukai. Comparison of Action of Iodin on Rabbits' and Human Eyes. Nippon Gank. Zasshi. Feb., 1919.

Netto, O. C. Caution Necessary with Thermal Mineral Waters in Treatment of Disease of the Eyes. Arch. Bras. de Med., v. 9, p. 504.

OPERATIONS.

Onishi. New Surgical Mask. (4 ill.) Nippon Gank. Zasshi. January, 1919.

REFRACTION.

Brown, H. H. Heredity in Myopia. Ill. Med. Jour., v. 36, pp. 230-233.

Cheatham, T. A. Psychology of Asthenopia. Southern Med. Jour., v. 12, pp. 626-629.

Eye Strain and Cinemas. Lancet, Oct. 25, 1919, pp. 744-745.

Jackson, F. D. Cross-cylinder in Testing Astigmatism. Optic. Jour. and Rev., 43, p. 1051.

Loomis, E. A. Refractive Needs in Children. Minn. Med., v. 2, p. 435.

March, C. A. High Myopic Astigmatism. Amer. Jour. Ophth., v. 2, p. 817.

Marquez. Mechanism of Skiascopy. (20 ill.) Arch. de Oftal. Hispano-Amer., v. 19, pp. 525-597.

Rönne, H. Determination of Astigmatism in High Degrees of Ametropia. Hospitalstidende 62, p. 933.

Transitory Condition of Refraction. Hospitalstidende, 62, p. 933.

Sakai. Berlin's Opacity and Traumatic Myopia. Nippon Gank. Zasshi, February, 1919.

Shibuya. Lowered Visual Acuity in Low Hyperopia. Nippon Gank. Zasshi, April, 1919.

Wilson, J. A. School Myopia. Brit. Med. Jour., Oct. 18, p. 512. 1919.

OCULAR MOVEMENTS

Dolman, P. The Maddox Rod Screen Test. Amer. Jour. Ophth., v. 2, pp. 757-758.

Hill, E. G. Distortion of Stereoscopic Images. Arch. of Radiol. and Electro., v. 24, p. 112. Abst., Jour. Amer. Med. Assn., v. 73, p. 1472.

Hayden, A. A. Vestibular Rotation Reactions and Examinations of Aviators in Signal Corps of U. S. A. (ill.) Ann. Otal. Rhinol. and Laryngol., v. 28, pp. 518-554.

Kashiwai. Congenital Defect of Ocular Muscles. (5 ill.) Nippon Gank. Zasshi, June, 1919.

Mazumoto. Ocular Muscles in Basedow's Disease. Nippon Gank. Zasshi, March, 1919.

Pulleine, R. Three cases of Ophthalmoplegia. Med. Jour. Australia, Sept., 1919, p. 217.

CONJUNCTIVA

Ascher. Results of Examination of Trachomatous Cases. Wien. med. Woch., 1918, No. 1, Clin. Opht., v. 23, p. 554.

Bowman, N. H. Diagnosis and Treatment of Conjunctivitis. Texas State Jour. Med., v. 15, p. 216.

Capps, C. M. Differential Diagnosis of Follicular Conjunctivitis and Trachoma. Jour. Tenn. State Med. Assn., v. 12, p. 208.

Goto. Tuberculosis of Conjunctiva. Nippon Gank. Zasshi, February, 1919.

Ito and Sukai. Streptococci in Normal Conjunctiva. Nippon Gank. Zasshi. January, 1919.

Harry, P. A. Treatment of Ophthalmia Neonatorum. Med. Times, v. 47, p. 87.

Jouveau-Dubreuil, H. Trachoma in Setchouen (China). Bull. Soc. Path. Exot., v. 11, p. 815.

McClanahan, F. C. Use of Mercuric Cyanid Solution Subconjunctivally. Jour. Amer. Med. Assn., v. 73, p. 1630.

Mine. Plasmoma of the Conjunctiva. Nippon Gank. Zasshi, January, 1919.

Nakamura and **Mazumoto.** Death from Hemorrhage of Conjunctiva in Newborn. Nippon Gank. Zasshi, April, 1919.

Nishioka. Parinaud's Conjunctivitis. Nippon Gank. Zasshi, March, 1919.

Sakaguchi. Inoculation of Trachoma Virus in Apes. Nippon Gank. Zasshi, February, 1919.

Scott, George D. Adenoids, Chronic Conjunctivitis, Photophobia. New York State Journal of Medicine, v. 19, pp. 374-377.

Repeated Titles. **Derby.** (v. 2, p. 710.) Amer. Jour. Ophth., v. 2, p. 767. **MacCallan.** (v. 2, p. 736.)) Brit. Jour. Ophth., v. 3, p. 498.

CORNEA AND SCLERA

Perrin, R. Keratitis due to Melinite. Clin. Opht., v. 23, p. 525.

Verhoeff, F. H. Keratitis Profunda (or Disciformis) with Microscopic Examination. (Dis.) Amer. Jour. Ophth., v. 2, pp. 759-760.

Wessely. Corneal Disturbances Caused by Cold. Arch. f. Augenh., 1917-1918, v. 83, pp. 1-11. (2 pl.)

ANTERIOR CHAMBER AND PUPIL

Espiño, J. M. Abnormal Reflexes of Pupil. Los. Prog. de la Clin., v. 7, p. 51.

UVEAL TRACT

Bancroft, W. D. Colors of Colloids (Blue Eyes). Jour. Phys. Chem., v. 23, p. 356.

Betti, L. Colon Bacillus Infection of the Eye. Rif. Med. v., 35, p. 784. Abst., Jour. Amer. Med. Assn., v. 73, p. 1478.

Color of the Iris During Infancy. Jour. Amer. Med. Assn., v. 73, p. 1445.

Jamamoto. Cyst of the Iris. Nippon Gank. Zasshi, March, 1919.

Okamura. Cases of Pupillary Membrane. Nippon Gank. Zasshi, March, 1919.

Snellen, H. Traumatic Aniridia. Amer. Jour. Ophth., v. 2, p. 747.

Choroidal Tuberculosis. Amer. Jour. Ophth., v. 2, p. 747.

Waardenburg, J. P. Hetrochromia and Melanosis. (Dis.) Amer. Jour. Ophth., v. 2, p. 747-749.

SYMPATHETIC DISEASE

Nowaga. Sympathetic Ophthalmia. Nippon Gank. Zasshi, February, 1919.

Gifford, H. Priority in the Literature of Sympathetic Ophthalmia. Amer. Jour. Ophth., v. 2, p. 766.

GLAUCOMA

Barkan, H. Angioneurotic Edema and Glaucoma. Amer. Jour. Ophth., v. 2, p. 800.

Kothary, P. T. Glaucoma. Indian Medical Gazette, October, 1919, v. 54, p. 396.

Terson, A. Late Results after Equatorial Sclerotomy in Glaucoma. Ann. d'Ocul., v. 156, p. 528-537.

Woodruff, H. W. Glaucoma. Illinois Med. Jour., v. 36, pp. 228-230.

Veasey, C. A. Ophthalmic Zoster, Retrobulbar Neuritis, Acute Glaucoma. (Dis.) Amer. Jour. Ophth., v. 2, pp. 760,763.

CRYSTALLINE LENS

Barraquer, I. Criticism of Modern Methods of Cataract Extraction. España Oftal., September, 1919, p. 265.

Fleischer, B. Myotonic Dystrophy and Cataract. Graefe's Arch. f. Opth., v. 96, parts 1 and 2. Brit. Jour. Ophth., v. 3, p. 514.

Hess, C. Senile Cataract. Arch. f. Augenh., v. 1917-18, 83, pp. 41-61.

Hoeve, van der. Senile Macular Changes and Senile Lens Opacities. (Dis.) Amer. Jour. Ophth., v. 2, p. 749.

Kamai. Cataract from Electric Current. (5 ill.) Nippon Gank. Zasshi, June, 1919.

Komoto. Cocain Anesthesia in Discission of Cataract. Nippon Gank. Zasshi, February, 1919.

Kümmell, R. Relation of Blood Serum to Lenticular Albumin in Diabetic Cataract. Arch. f. Augenh., v. 17, p. 559.

Okamura. Punctate Cataract. Nippon Gank. Zasshi. April, 1919.

Torland, A. New Method in Cataract Operations. Jour. Lancet, v. 39, pp. 589-590.

White, E. W. W., and **Butler, T. H.** Suppuration after Cataract Extraction Successfully Treated. Brit. Jour. Ophth., v. 3, p. 496.

Wing, P. B. Congenital Aphakia. Amer. Jour. Ophth., v. 2, p. 818.

VITREOUS

Ichima. Entrance of Bacilli into Vitreous thru Trauma. Nippon Gank. Zasshi, June, 1919.

Köllner. Visibility of Hyaloid in Vitreous. Arch. f. Augenh., v. 83, 1917-18, 12, 1 pl.

RETINA

Ashikaga. Idiopathic Hemeralopia and Oguchi's Disease. Nippon Gank. Zasshi, January, 1919.

Bohemier, P. S. Retinal Hemorrhage, Union Med. du Canada, 48, p. 178.

Cobb, P. W. Dark Adaptation. Amer. Jour. Ophth., v. 2, p. 758.

Masuda. Ophthalmoscopy of Background of Syphilitic Eye. Nippon Gank. Zasshi. March, 1919.

Maxey, E. E. Hole at Macula. Amer. Jour. Ophth., v. 2, p. 792.

Middleton, A. B. Macular Hole in Retina. Amer. Jour. Ophth., v. 2, p. 779.

Okamura. Hemeralopia in the New-born. Nippon Gank. Zasshi, May, 1919.

Taylor, I. Retinal Detachment of Doubtful Origin. (2 ill.) Practitioner, v. 103, p. 310.

Veasey, C. A. Retinal Embolism. Amer. Jour. Ophth., v. 2, p. 817.

Wada. Retinitis Circinata. Nippon Gank. Zasshi, April, 1919.

Repeated Titles. **Urra.** (v. 2, p. 775.) Jour. Amer. Med. Assn., v. 73, p. 1400.

OPTIC NERVE

Bollack, J. Papillary Stasis and Dilatation in Ventricles of Heart in Cerebral Tumor. (Bibl., 10 ill.) Ann. d'Ocul., v. 156, pp. 538-570.

Fusisima. Coloboma of Optic Nerve. (2 col. pl.) Nippon Gank. Zasshi, May, 1919.

Garcia del Mazo, J. Optic Neuritis with Atrophy, Consecutive to Sudden Suppression of Menses after Emotional Shock. Rev. de Med. y Cirurg. Pract., v. 123, p. 426.

Igersheimer, J. Pathology of Optic Nerve. Graefe's Arch. f. Ophth., v. 96, parts 1-2. Clin. Opht., v. 23, p. 553.

Jano. Optic Neuritis and Myelitis from Influenza. Nippon Gank. Zasshi, June, 1919.

Komoto. Parapapillary Choroidal Atrophy. Nippon Gank. Zasshi, January, 1919.

Snellen, H. Optic Neuritis. (Pseudo-Neuritis.) Amer. Jour. Ophth., v. 2, p. 747.

VISUAL TRACTS AND CENTERS

Beach, S. J. A Scoop Perimeter. Amer. Jour. Ophth., v. 2, p. 796.

Burdon, R. S. Binocular Vision and Roentgenography. Arch. of Rad. and Electrotherap., v. 24, p. 101. Abst., Jour. Amer. Med. Assn., v. 73, p. 1472.

Holmes, G. Disturbances of Visual Space Perception. Brit. Med. Jour., Aug. 23, 1919, p. 230.

Hurst, A. F. Hysteria. Lancet Nov. 1, 1919, pp. 771-775.

Kikita. Fields of Vision and their Limitations. Nippon Gank. Zasshi, May and June, 1919.

Lutz, A. Eye Symptoms in Pseudo-tumor Cerebri. Arch. of Neurol and Psychiat., November, 1919, p. 539.

Pagenstecher, A. H. Scintillating Scotoma. Arch. f. Augenh., 1917-18, 83, p. 14-33.

Stephenson, S. Eye Symptoms as the Only Indication of Fractured Base of the Skull. (Bibl.) Brit. Jour. Ophth., v. 3, pp. 505-509.

Zeeman, W. P. C. Struggle of the Visual Fields (with demonstration). Amer. Jour. Ophth., v. 2, p. 752.

Repeated Titles. **Best.** (v. 1, p. 751.) Brit. Jour. Ophth., v. 3, p. 521.

EYEBALL

Samperi. Metastatic Ophthalmia in Influenza. Gior. di Med. Mil. Rome, v. 67, p. 597.

Itoh. Metastatic Panophthalmitis from Typhus Bacilli. Nippon Gank. Zasshi, June, 1919.

THE LACRIMAL APPARATUS

Wada. Specific Gravity and Physical and Chemical Character of the Tears. Nippon Gank. Zasshi, May and June, 1919.

LIDS

Bedell, A. J. Multiple Vaccination of Eyelids. (Dis.) Amer. Jour. Ophth., v. 2, p. 759.

Bland-Sutton, J. The Third Eyelid. (6 ill.) Lancet, October 18, 1919. pp. 673-675.

Kalt. Restoration of Lid after Total Destruction. (2 ill.) Ann. d'Ocul., v. 156, pp. 521-574 and 575.

Marin Amat, M. Marcus Gunn's Syndrome. (Bibl., 3 ill.) Ann. d'Ocul., v. 156, pp. 513-528.

Schnyder, W. F. The Swallowing Reflex Elicited from the Eye. Corresp.-bl. f. Schweizer Aertze, v. 49, p. 1388. Abst., Jour. Amer. Med. Assn., v. 73, p. 1478.

Wilder, W. H. Symblepharon with Restoration of Orbital Socket. Amer. Jour. Ophth., v. 2, p. 807.

ORBIT.

Hilario de Gouvea. Ocular Protheses. Brazil-Med., v. 33, p. 341. Abst. Jour. Amer. Med. Assn., v. 73, p. 1479.

Repeated Titles. **Souques and Lermoyze.** (v. 2, p. 306.) Jour. Amer. Med. Assn., v. 73, p. 798.

PARASITES

Pacheco Luna, R. Disturbances of Vision from Filarial Tumors. Amer. Jour. Ophth., v. 2, p. 793.

Repeated Titles. **Holth.** (v. 2, p. 842.) Jour. Amer. Med. Assn., v. 73, p. 1564.

TUMORS

Castelain. Tumor of Macular Region. Soc. d'Opht. de Paris, July, 1919. Ann. d'Ocul., v. 156, p. 576.

Coffin. Sarcoma of Orbit Removed thru Killian Incision. Laryngoscope, v. 28, p. 881.

Cousin. Fibroma of Orbital Cavity. Soc. d'Opht. de Paris, July, 1919. Ann. d'Ocul., v. 156, p. 575.

Komoto. Papilloma of Cornea. (1 col. pl., 2 ill.) Nippon Gank. Zasshi, May, 1919.

Kuboki. Tumor of Lacrimal Gland. Nippon Gank. Zasshi, April, 1919.

McBean, G. M. Choroidal Carcinoma, Bilateral Metastasis from Breast. Jour. Amer. Inst. Homeop., v. 12, pp. 511-512.

INJURIES

Aubaret. Lesions of Lacrimal Apparatus in War Injury. Marseilles Méd., v. 56. p. 145.

Buchanan, L. Unusually Extensive Rupture of the Corneo-Scleral Margin. Brit. Jour. Ophth., v. 3, p. 497.

Hack, R. Indelible Pencil Wounds of the Eye. Arch. f. Augenh., 1917-18, 83, pp. 34-37.

Le Pendu. Enucleation or Evisceration in Treatment of Ocular Wounds. Clinique, August, 1919, Clin. Ophth., v. 23, p. 546.

Wheeler, J. M. War Injuries of Lids and Plastic Operations. Amer. Jour. Ophth., v. 2, p. 759.

Wiley, A. Injury to Eye. Therapeutic Gaz., v. 43, p. 759.

Repeated Titles. **Igersheimer.** (v. 2, p. 752.) Brit. Jour. Ophth., v. 3, p. 523.

GENERAL DISEASES

Brose, L. D. Focal Disease Involving Antrum, Teeth, and Eye. Laryngoscope, v. 29, p. 583.

Calhoun, F. P. Ocular Complications of Typhoid Inoculation. (Dis.) Amer. Jour. Ophth., v. 2, p. 752-753.

Genoese, G. Oculocardiac Reflex in Infant. Gaz. Intern. di méd Chir., 1918. Abst., Arch. Méd. des Enfants, v. 22, p. 495.

Harkness, C. A. Luetic Affections of the Eye and Their Management. Jour. Amer. Inst. Homeop., v. 12, pp. 512-518.

Jeans. Cerebro-spinal Involvement in Hereditary Syphilis. Amer. Jour. Dis. Children, September, 1919. Abst., Amer. Jour. Med. Sc., v. 158, p. 747.

Nakamura. Relation of Blood Pressure and Eye Disease. Nippon Gank. Zasshi, January, 1919.

Piper, A. S. Syphilis of the Eye. Jour. Okla. State Med. Assoc., v. 12, p. 270.

Snellen, H. Intraocular Tuberculosis. (Dis.) Amer. Jour. Ophth., v. 2, p. 747.

Winslow, K. Epidemic Lethargic Encephalitis (nona) in Seattle. Northwest Med., 18, p. 209.

COMPARATIVE OPHTHALMOLOGY

Howe, L. Migration of Eye in Flounders. Amer. Jour. Ophth., v. 2, p. 758.

HYGIENE

Bahrenburg, L. P. H., and Kerr, J. W. Prevention of Blindness in Missouri. Jour. Missouri Med. Assn., v. 16, pp. 385-386.

Beals, M. B. Sight Conservation Work in Public Schools. Bull. Dept. Health, New York, v. 9, p. 220.

Graves, W. W. Help Prevent Blindness. Jour. Missouri State Med. Assn., v. 16, pp. 393-394.

Prevention of Blindness in Missouri. Jour. Miss. St. Med. Assn., v. 16, p. 385.

OPHTHALMIC SOCIOLOGY

Bahn, C. A. Ophthalmologic Paris. Amer. Jour. Ophth., v. 2, p. 804.

Blind Polish Children. New York Med. Jour., v. 110, August 16, 1919, p. 291.

Bouquet, H. Signature of the Blind. Le Mond Medical, October, 1919, p. 241.

Günther, H. Reading Machine for Blind. Bl. f. Volksgsndhtspfl., 1919, 18, pp. 112-115.

Higgins, S. G. Visual Disability from Injury and Compensation. Amer. Jour. Ophth., v. 2, p. 813.

Jess, A. Ophthalmologic Experiences in War. Samml. zwangl. Abhandl. a. d. Geb. d. Augenh., Halle a. S., 1918, 10, 1-37.

Onfray Report of Commission on Spectacles. Soc. d'Opht. de Paris, July, 1919. Ann. d'Ocul., v. 156, p. 575.

Onishi. Making of Glasses. Nippon Gank. Zasshi, February, June, 1919.

Rasquin. Reduction in Capacity for Work after Traumatic Cataract. Clin. Ophth., 23, p. 515.

Wallace, W. Statistics of Cases Seen During Four Years in the R. A. M. C. Brit. Jour. Ophth., v. 3, pp. 481-496.

Wholey, C. C. Our Blinded Soldiers. Jour. Amer. Med. Assn., v. 73, pp. 1568-1574.

Würdemann, H. V. W. The Army Ophthalmic Surgeon. Amer. Jour. Ophth., v. 2, pp. 765-766.

For Journal Indexes see preliminary matter.